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Estuarine Response to Nutrient Enrichment A Counterpart of Eutrophication. Volume II An Annotated Bibliography

Chesapeake Research Consortium, Inc, Annapolis, MD

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ESTUARINE RESPONSE TO NUTRIENT ENRICHMENT, A COUNTERPART OF EUTROPHICATION:

AN ANNOTATED BIBLIOGRAPHY

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"An Annotated Bibliography" is Volume II of a three volume set containing material related to Nutrient Enrichment of Estuaries. Materials included in this Volume were collected from articles in scientific journals, chapters in books, and other writings of the like. They were collected by a variety of methods, including the use of DIAL 06 Information Retrieval Service, manual research of various abstracting publications and the science citation index.

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PREFACE

This work is a result of our efforts to compile the literature related to the results of nutrient enrichment of estuaries. It consists of two related publications, a bibliography and an annotated bibliography; both works are accompanied by an index which applies to either bibliography. An attempt has been made to include some key papers related to various processes, eg. , nutrient uptake by phytoplankton, which influence or participate in the response process.

Items included are wide ranging from articles in scientific journals, chapters in books, and manuscripts for such publications to the grey literature of project reports, theses and the like. They have been accumulated by a variety of methods including the use of the DIALOG Information Retrieval Service (Lockheed Information Systems), manual search of various abstracting publications and the original contemporary literature as well as direct input from authors responding to direct and indirect solicitation. Science Citation Index (Institute of Scientific Information) was also utilized as a source. Annotations rely heavily on abstracts from authors or abstracting services.

Copies of all the original documents are being acquired and will be available for personal use at the CRC headquarters and the four Consortium member institutions. They are on microfiche. Information on availability to the public is contained within each citation. Bibliography users who have difficulty obtaining original materials may approach MERRMS of VIMS concerning availability of non-copyrighted materials on microfiche at cost plus handling.

These publications were produced under great time pressures and a number of citations were omitted. The senior author accepts complete responsibility for these omissions and apologizes to friends, colleagues and other scientists for omission of their works.

The authors thank Ms. Linda L. Jenkins for many hours of effort in front of a computer terminal, the staff of the VIMS library for efforts to obtain reference materials, the MERRMS staff for microfiche facilities, and especially to Geri Ellis, Dan Ewart and Pete Hoyle of the William and Mary Computer Center for extensive help in making the storage, manipulation, and retrieval of the bibliographic information possible.

K. L. Webb

17 May 1979

Estuarine response to nutrient enrichment bibliography field coding. *

CODE	FIELD
1	Author(s)
2	Address
3	Title of Article;if in a Book: Title, Editors
4	Publisher or Journal
5	Year, volume, pages
6	Language
7	Abstract

*The code numbers do not appear in the citations. Fields are separated by blank lines, empty fields are blank.

The index is a cross referenced listing of descriptors relevant to each citation. The numbers accompanying the listings refer to citation numbers.

Citation 1

AALTO, J. A. , N. A. JAWORSKI, D. W. LEAR, JR.

Federal Water Quality Administration, Chesapeake Technical Support Lab, Annapolis, MD

Current Water Quality Conditions and Investigations in the Upper Potomac River Tidal System

Fed Water Qual Admin, CTSL

1970(May), Technical Rep. No. 41,38p.

English

Based on data obtained by field investigations and from wastewater treatment agencies in the Washington metropolitan area, a statement on current water conditions and investigations of the Upper Potomac River tidal system was prepared and summarized. Fecal coliform densities are lower than in 1965 as a result of the increased chlorination of treated waste discharges since 1969. High fecal coliform densities were prevalent at times of high stream flow above the major basin, urban runoff, storm sewers and combined sewer outflows. Tributaries also contained very high fecal coliform densities at times. Extensive phytoplankton blooms were detected. Since the late 1930's the amount of phosphorus entering the Potomac has increased about tenfold and nitrogen increased about fivefold. The major shift toward nuisance blue-green algal growths appears to be related to increases in nitrogen and phosphorus, and not BOD (carbon). Most of the phosphorus which entered the tidal system from the upper basin, plus some from local wastewater discharges, was absorbed and deposited in the bottom sediments of the estuary. Dye and mathematical model investigations indicate that wastewater assimilation and transport rates are very low.

Citation 2

ABBOTT, O. J.

Univ. of Strathclyde, Marine Laboratory, Kilcreggan

Black Necrosis in Brown Shrimp, Crangon crangon

In: Proceedings of the Symposium on the Burry Inlet (South Wales),13-15 (Sept) 1976. Edited by A. Nelson-Smith and E. M. Bridges. Problems of a Small Estuary. Quadrant Press Ltd. Swansia, West Glamorgan

1977(Jan), Session 3,2/1-2/10.

English

A disease, black necrosis, caused by chitinoclastic bacteria affects the exoskeleton of marine Crustacea. Incidences of infection have been correlated with organic and industrial pollution for the brown shrimp, Crangon sp. For this study shrimp were sampled from 5 stations in the Salway Firth and examined for necrotic lesions. Incidence of lesion was correlated to trace metals, detergent concentration, temperature, salinity, pH, DO, population age-sex, physiological differences, and other infections or injuries. No clear relationships were discerned. Abstr by JMB

Citation 3

ABBOTT, W.

Gulf Coast Research Lab. , Ocean Springs, MS

Nutrient Studies in Hyperfertilized Estuarine Ecosystems. I. Phosphorus Studies

Adv Water Pollut Res

1970,4(II-3240),729-739.

English

It was established on a pseudokinetic, long-term basis that some experimental systems assimilated exogenous dissolved orthophosphate according to a first-order, presumptively sorption-limited, reaction scheme. Further, photosynthetic production and community respiration were correlated with nitrate and phosphate fertilization. Relevant field studies are reported. Three forms of phosphorus were defined: dissolved, labile, and bound. Analyses were carried out for orthophosphate or total phosphate on each phosphorus fraction. Of nitrogen forms, only nitrate was monitored. Eighteen experimental ponds were constructed by capturing a small bayou channel and fertilized. Trends evident by passage of P-32 through the pond environment suggest a steady-state ecological phosphorus processing machine. Differences between fertilized and control ponds indicate that a demand system probably controls allocations to various ecosystem sub-units. From this standpoint, at least relative to phosphorus, an estuary is not a 'nutrient trap' but is, rather, a 'nutrient buffer' tending to modulate phosphorus flow through the ecosystem while obviating wild fluctuations in the phosphorus economy.

Sediments, in this context, are the phosphorus stockpile. Periodically, turbulence effects cycle part of this stored reserve. Metabolic demands within the community may withdraw any required phosphorus from the flux and the excess is soon returned to the stockpile.

Citation 4

ABERDEEN MARINE LABORATORY

Aberdeen Marine Lab. , Library;Aberdeen, UK

Water Pollution: A Bibliography of Reports

Aberdeen Marine Lab. , Library;Aberdeen, UK

1977,38p.

English

This bibliography is a listing of reports on water pollution, acquired by the library of the Aberdeen Marine Lab. , during the years 1974-1976. It contains 308 references, divided into the following sections: A. General B. Oil C. Oil Removal D. Metals E. Pesticides F. Radioactivity G. Thermal H. Sewage and Industrial Wastes I. Eutrophication J. Dredging K. Effects of Pollution L. Economics

Citation 5

ADMIRAAL, W.

Groningen Rijsuniversiteit (Netherlands), Dept. of Systematic Botany

Tolerance of Estuarine Benthic Diatoms to High Concentrations of Ammonia, Nitrite Ion, Nitrate Ion and Orthophosphate

Mar Biol

1977,43,307-315.

English

Ten species of benthic diatoms were cultured unialgally in synthetic media with various concentrations of ammonia (NH4+ +NH3), nitrite ion, nitrate ion, and orthophosphate. Most of the species grew well in media with very high concentrations of nitrite ion (1 to 10 mg-at N 1-1), nitrate ion (about 16.9 mg-at N 1-1) and orthophosphate (at least 0.9 mg-at P 1-1).

Ammonia concentrations higher than 0.5 mg-at N 1-1 inhibited growth of the cultures. The rate of photosynthesis of diatoms from the field and from cultures was also inhibited by 0.5 mg-at N 1-1 of ammonia under certain conditions. Inhibition of photosynthesis by ammonia was strongly enhanced by high irradiance and high pH. It was unlikely that nitrite ion, nitrate ion, and orthophosphate attained concentrations high enough to be inhibitory in the field, but concentrations of ammonia may have been high enough for inhibition to occur. A clear relationship between sensitivity of the diatoms and their occurrence on more or less polluted mudflats was not found.

Citation 6

ALAM, M. I. , C. P. HSU, Y. SHIMIZU

Dept. of Pharmacognosy and Environmental Health Sciences, College of Pharmacy, University of Rhode Island, Kingston, RI 02881

Comparison of Toxins in Three Isolates of Gonyaulax tamarensis (Dinophyceae)

J Phycol

1979,15,106-110.

English

Toxicity levels and profiles of three isolates of Gonyaulax tamarensis Lebour grown under the same conditions were compared. One isolate was collected from Ipswich, Massachusetts, during the massive red tide of 1972 along the New England coast. The other two isolates were obtained from Perch Pond (Falmouth, Massachusetts) and Mill Pond (Orleans, Massachusetts) located in the southwest and south of Cape Cod, Massachusetts, respectively. All the three cultures produced toxins with variation in their toxicity levels. Toxin contents were highest in their toxicity levels. Toxin contents were highest in the Ipswich isolate, followed in an order by Mill Pond and Perch Pond cultures. Morphological similarity existed between Ipswich and Mill Pond cells, whereas the Perch Pond cells possessed an additional ventral pore on the 1' epithecal plate.

Citation 7

ALASKA UNIV. COLLEGE INST. OF MARINE SCIENCE

Alaska

Environmental Studies of an Arctic Estuarine System - Final Report

US Environmental Protection Agency

1975(June), Ecol. Res. Ser. No. EPA-600/3-75-026,54p.

English

The Colville River estuarine system was studied over a period of four years. Physical, chemical, geomorphological and biological features were included. North slope river deltas differ significantly from those elsewhere, due to climatological extremes and a long, cold, dark winter with continuous ice-cover and continuous daylight during the summer with melting ice or open water. Basic information has been obtained on the winds, waves and currents. Predominant current directions are from the west, with wind drift currents with a periodicity of 4 to 5 days. Beach sediments are characterized as poorly sorted gravelly sandy sediment in a relatively low energy environment. The ice-free biological regime is strongly influenced by the river input of low salinity water containing relatively high concentrations of nitrogen nutrients. An annual primary production in the estuary is estimated at 10-15 g-C sqm. Crustaceans, molluscs and polychaetes characterize the macrofauna at depths exceeding 2 m, with but few species responsible for most of the biomass. Interesting features of the chemical regime are connected with the isolation of hypersaline water in the shallow estuarine and river system. Fresh water systems were included in the study.

Citation 8

ALLEN, G. W.

Humboldt State Univ. , Arcata, CA

Rearing Pacific Salmon in Saltwater Ponds Fertilized with Domestic Wastewater

Humboldt State Univ.

1976(Nov), Rep. HSU-SG-10,92p.

English

Two 0.15-hectare ponds using mixtures of treated domestic wastewater and seawater were used to rear juvenile salmonids without supplemental feeding. Ponds are located within the periphery of an oxidation pond located on the north arm of

Humboldt Bay, Humboldt County, Arcata, California. Forced air and surface spray systems of pond aeration and mixing of pond waters were employed to maintain water quality. Fingerling coho salmon (Oncorhynchus kisutch) and rainbow trout (Salmo gairdneri) were reared together using both ponds. Polyculture of coho and rainbow trout at about 5 fish per square meter planting density resulted in survival rates of 55-85% and a total fish production rate of about 200 kg/ha/yr in both ponds. Survival of chinook salmon was low due to an unusual loss of fry early in the experiment apparently from a combination of supersaturation of the blood with oxygen and/or high pH values.

Citation 9

AMANIEU, M. , O. GUELORGET, P. MICHEL

Laboratoire d'Hydrobiologie marine et continentale, Universite des Sciences et Techniques du Languedoc, Place E Bataillon, 34060 Montpellier, France

Richness and Diversity of Benthic Macrofauna of a Mediterranean Lagoon

Vie Milieu

1977, B27(1),85-109.

English

A 400-hectare lagoon was sampled monthly from 1973-74 in order to observe specific richness (number of species) and diversity over time and space using Shannon's index. Interstation comparisons (Shannon's diversity in space) allowed classification into groups. Chronological analysis of intrastation diversity (Shannon's diversity with time) shows the effects of accidents (e. g. pollution) or systematic phenomena (e. g. summer stress) on populations. A systematic comparison emphasizes behavioral differences of each major group. It is pointed out that molluscs are a major influence in the evolution of diversity.

Citation 10

ANDERSON, DONALD MARK, DAVID WALL

Dept. of Civil Engineering, Massachusetts Institute of Technology, Cambridge, MA 02139

Potential Importance of Benthic Cysts of Gonyaulax tamarensis and G. excavata in Initiating Toxic Dinoflagellate Blooms

J Phycol

1978,14(2),224-234.

English

Thick-walled, nonmotile cysts (termed hypnocysts) of two dinoflagellates were isolated from estuarine sediments in Cape Cod, Massachusetts, and germinated to produce their respective motile, thecate stages. Hypnocysts from Orleans district were identified as Gonyaulax excavata (Braarud) Balech sensu Loeblich & Loeblich. Visually identical hypnocysts from Falmouth district were provisionally identified as Gonyaulax tamarensis Lebour. Both species were toxic. A geographic survey in September detected hypnocysts in only the sediments of locations where toxic blooms developed the preceding and following Spring. Laboratory incubation (16 C) of hypnocysts from sediment samples stored in the dark (5 C) for 6 mo initiated excystment by the temperature increase, with no appreciable effect from light regime, nutrient, or chelator concentrations. Motility of excysted germlings was optimum in highly chelated medium and in the presence of light. We conclude that hypnocysts of both taxa are important in seeding recurrent annual blooms, synchronizing early bloom development with vernal warming of seawater and increasing the geographic range of the species. We suggest that many red tides in New England and eastern Canadian waters are initiated through the displacement of motile estuarine populations into nearshore areas by tidal advection and surface runoff, although the potential existence and importance of offshore cyst reservoirs cannot be discounted. Evidence is presented that hypocysts are probably sexual zygotes whereas the thin-walled cysts readily formed in laboratory cultures (pellicle cysts) are asexual. Pellicle cysts are of limited durability, do not overwinter in nature, and therefore do not play a significant role in initiating toxic blooms.

Citation 11

ANGER, K.

Biologische Anstalt Helgoland (West Germany)

On the Influence of Sewage Pollution on Inshore Benthic Communities in the South of Kiel Bay. Part 2. Quantitative Studies on Community Structure

Helgol Wiss Meeresunters

1975,27,408-438.

German

The sandy bottom of a shallow inshore region in the South of Kiel Bay (Baltic Sea) was studied for the influence of organic sewage pollution on the macrobenthic community structure. Three associations characterize the bottom: Capitella capitata and Oligochaeta at 50-100 m from the sewage outlet; Pygospio elegans at 200 to about 700 m; and Bathyporia sarsi at greater than 700 m. The influence of the biological substrate structure becomes more apparent in less affected areas. The inshore benthic macrofauna aids in the self purification of the ecosystem by transforming particulate organic matter to available fish food. Abundance and biomass are multiplied due to sewage sedimentation. Highly diverse systems such as mussel beds resist factors which directly influence the composition of the community. The ecological buffer consists of many specialized competitors and predators. Faunal composition, evenness, species richness, population density, and biomass of the communities are suitable parameters for the early recognition of environmental stress.

Citation 12

ANGER, K.

Biologische Anstalt Helgoland (West Germany)

Benthic Invertebrates as Indicators of Organic Pollution in the Western Baltic Sea

Int Rev Gesamten Hydrobiol

1977,62(2),245-254.

English

The quantitative distribution of some important benthic invertebrates in a shallow inshore area of Kiel Bay (Western Baltic Sea) is described. This region is partly polluted by domestic sewage from the municipality of Kiel. Three groups of species are distinguished with reference to their densities and other population parameters in the different subareas. Progressive species of the 1st and 2nd order indicate a high and moderate to slight degree of pollution respectively by high population numbers. Regressive species are adverse indicators, absent or occurring in exceptionally low numbers in affected areas. In many cases the examination must be concentrated on sand bottom, because a series of species normally dwelling on aufwuchs build up dense populations in sand, if it is organically enriched.

Citation 13

ANONYMOUS

Second International Conference on Toxic Dinoflagellate Blooms

1978(Oct 31-Nov 5),40p.

English

Document is a bibliography of citations with abstracts on toxic dinoflagellate blooms in coastal waters; the papers are available from the authors.

Citation 14

ANONYMOUS

Protecting America's Estuaries: Florida (Part 2)

Hse Comm Govt Operations Hearings 93 Con 1

1973 (May),26p.

English

Hearings were held on the environmental problems affecting Florida's estuaries, and coastal and other waters. Considerations included: whether various federal agencies are effectively and efficiently carrying out their duties to protect and enhance the environmental quality of Florida; efforts to prevent eutrophication-mostly due to phosphates-of Florida's waters; the effect of ocean outfalls on ocean resources, human health, and public recreation; the extent to which wetlands are being destroyed by dredging and filling; and the progress, or lack of it, in providing adequate treatment for municipal and industrial wastes. Witnesses included educators, and officials from the Sierra Club, the Nat'l Audubon Society, and other environmental groups. Statements, letters, and related data are transcribed. (numerous tables)

Citation 15

ANONYMOUS

Bibliography on Pollu of Estuaries Coastal Waters

1972 (Aug)

English

Citation 16

ARCHIMBAUD, M. , C. TROUVE

Commissariat a l'Energie Atomique, Pierrelatte (France)

The Linkage Between Chemical Pollution and Bacteriological Pollution in Coastal Zones

Water Res

1976,10(3),225-229.

French

Analysis of water samples taken from 4 locations near Marseille, France, in the Etange de Berre (Baie de Vaine, Baie de St. Chamas) and in the Mediterranean Sea near the Marseille Sewer at Cortiou is reported. The study was undertaken in order to view correlations between pollution as measured by bacteriological and chemical indicators, particularly in waters which are meant for swimming. Since chemical analysis is the faster of the 2 techniques, it would be possible to use these measures to quickly and precisely survey areas of possible pollution. Samples were taken (146 in total) and sent to a laboratory for bacteriological analysis and chemically analysed in a mobile laboratory at the sampling site. For the former, the number of coliform bacteria and escherichia coli were counted and for the latter detergent anions and ammonia were measured. Visual analysis of the figures obtained revealed that an attempt to correlate the figures mathematically would be statistically biased because of the form of the distributions. Each of the measures was divided into 3 sections: weak, medium and strong concentrations. This revealed interesting results. A first estimation is that for all samples where the concentration of detergents is greater than 350 micrograms per litre corresponds to water polluted by bacteria and all samples where the concentrations of detergents were less than or equal to 300 micrograms per litre and ammonia was less than 100 micrograms per litre is non-polluted water. These definitions would permit a decision in perhaps two-thirds of all areas studied and the area of uncertainty could perhaps be narrowed with further study and other environmental and meteorological parameters could be taken into account.

Citation 17

ARMSTRONG, J. W.

Washington Univ. , Seattle

The Impact of Subtidal Sewage Outfalls on the Intertidal Macrofauna of Several Central Puget Sound Beaches

Washington Univ.

1977, PhD Dissertation, 233p.

English

The intertidal macrofauna were surveyed over a 21-mo period at five beaches located near municipal outfall sewers in Puget Sound, Washington. The 80 sites, sampled every three months, were characterized by fine-grained wave-rippled sand or cobble-strewn mixed sediments. Sampling yielded 302 species of intertidal invertebrates and fish; infauna and epifauna were screened from sediment samples. The control beach and the beach considered most likely to be affected by the outfall discharges yielded the highest number of species; 10-15% fewer species were obtained from the other sites. Substrate type rather than the extent of pollution controlled the degree of species differentiation; benthic faunal diversity was greater in individual samples than the variability between different beach samples. Saxidomus giganteus and Macoma inquinata collected at the beach most likely to be affected by outfall discharges did not exhibit deteriorated bivalve condition index values; growth rates of Hemigrapsus oregonenesis and S. giganteus were not substantially different from those at other beaches. Although several species of pollution-indicating polychaete feeding types were collected at all beach sites, the proportions were similar at all beaches and not considered to be related to waste disposal. Stepwise discriminant analyses yielded no pollution-related gradients; benthic faunal variations were primarily dependent upon sediment type.

Citation 18

ARMY CORPS OF ENGINEERS

Baltimore District, Dept. of the Army, MD

Chesapeake Bay Existing Conditions Report, Appendix-C; The Bay Processes and Resources

US Dept of the Army

1973, Vol. 2.

English

This project consisted of the following objectives: a. Identification of current biological researchers, research activities, and research agencies. b. Inventory of biological organisms occurring within Chesapeake Bay. c. Assessment of the extensiveness and intensiveness of our knowledge concerning these organisms and their sensitivities to change. d. An examination of data processing systems, methods, and capability. This effort would produce some estimate of present capability and future potential. e. An examination of possible and currently used techniques for estimating the biological effects of environmental alteration. f. An attempt to initiate and eventually develop standardized methods for conducting, analyzing, and reporting research results. g. A reexamination of the current state of the art in referrence to the other topical areas of the Corps report.

Citation 19

ASTON, S. R. , C. N. HEWITT

Lancaster Univ. , Bailrigg (England), Dept. of Environmental Sciences

Phosphorus and Carbon Distributions in a Polluted Coastal Environment

Estuarine Coast Mar Sci

1977(Mar),5(2),243-254.

English

Phosphorus and organic carbon distributions were used to examine the effect of pollution from sewage effluents on a semi-enclosed tidal area. The phosphorus and organic carbon accumulating in the sediments of the area were related to the influx of particulate matter during tidal cycles, and some of the environmental factors determining the influence of marine effluent disposal on a coastal zone were assessed.

Citation 20

AUBERT, M. , J. AUBERT, J-M. PINCEMIN, N. DESIROTTE, J-P. BREITTMEYER

Centre d'Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France)

Restructuring of River Banks and Secondary Pollution: Study of Eutrophications in Port Areas

Rev Int Oceanogr Med

1972,26,53-64.

French

Harbor areas, withdrawn from hydrological exchanges with open sea, are the locality of accumulation of substances and wastes, leading, thereby, to some biological lack of balance of marine environment. The physics, chemistry, bacteriology and planktonology were studied. Results allowed, by statistical treatment, to point out a number of characteristic correlations of a more or less pronounced eutrophic state.

Citation 21

AXELRAD, D. M. , M. E. BENDER , K. A. MOORE

Virginia Inst. of Marine Science, Gloucester Point, VA

Function of Marshes in Reducing Eutrophication of Estuaries of the Middle Atlantic Region

VIMS

1974 (Feb), Completion Rep. OWRR B-027-VA(1),91p.

English

Annual nitrogen, phosphorus and carbon budgets for two Virginia salt marshes were determined by monthly measurements of water discharge and constituent concentrations over tidal cycles. Considering all three forms of phosphorus measured (total, dissolved organic and orthophosphate) there was a net loss from the estuary to the marshes. Nitrogen flux data show a loss of nitrate and nitrite to the marshes. Carbon flux data show significant contributions of both particulate and dissolved organic carbon to the estuary from the marshes.

Citation 22

AXELRAD, DONALD M. , KENNETH A. MOORE, MICHAEL E. BENDER

Virginia Inst. of Marine Science, Gloucester Point, VA

Nitrogen, Phosphorus and Carbon Flux in Chesapeake Bay Marshes

WRRC Virginia (Blacksburg)

1976(Jan), VPI-VWRRC-Bull 79.

English

Annual nitrogen, phosphorus and carbon budgets for two Virginia salt marshes were determined by monthly measurements of water discharge and constituent concentrations over tidal cycles. Considering all three forms of phosphorus measured (total, dissolved organic and orthophosphate) there was a net loss from the estuary to the marshes. The data reveal a loss of particulate phosphorus of estuarine origin to marsh sediments and mineralization of this phosphorus in the marshes with subsequent export of dissolved inorganic and organic phosphorus back to the estuary. Nitrogen flux data show a loss of nitrate and nitrite to the marshes. Particulate nitrogen is imported to the marshes where it is mineralized and returned to the estuary as ammonia and dissolved organic nitrogen. The magnitude of nitrogen export suggests significant fixation of atmospheric nitrogen by marsh flora with subsequent export as dissolved species. Carbon flux data show significant contributions of both particulate and dissolved organic carbon to the estuary from the marshes. Estimates of export, based on marsh grass productivity, suggest a loss of 36 and 49 percent of a year's primary production on the marshes as detritus for Ware and Carter Creeks respectively.

Citation 23

AYRES, P. A.

Ministry of Agriculture, Fisheries and Food, Burnham-on-Crouch (England), Fisheries Lab

The Use of Faecal Bacteria as a Tracer for Sewage Sludge Disposal in the Sea

Mar Pollut Bull

1977(Dec),8(12),283-285.

English

The movement of sewage sludge discharged into Liverpool Bay in England was followed using bacteria indigenous to sewage as a tracer. Enumeration of E. coli and other enterobacteria associated with fecal waste was accomplished within two days for samples of bottom sediment collected from 62 sites in Liverpool Bay. Initial concentrations of coliforms in the sediment samples proved higher than E. coli concentrations, indicating greater survival of coliform bacteria over a large area. Movement of the bacteria demonstrated a definite easterly direction towards the River Mersey and rising tide; little northerly or southerly movement was observed. Previous studies with radioactive tracers had yielded similar results and indicated rapid dispersion with east-west settlement over an area 8-km wide by 30-km long. Fecal bacteria was found to collect in muddy sediments and had a short viability in seawater.

Citation 24

BACH, STEVEN D. , MICHAEL N. JOSSELYN

Dept. of Biology, Allegheny College, Meadville, PA 16335

Mass Blooms of the Alga Cladophora in Bermuda

Mar Pollut Bull

1978,9(2),34-37.

English

A bloom of the green macroalga Cladophora has been recently reported from the island of Bermuda. The alga has increased considerably since the late 1960's and at present, mats of Cladophora averaging 10 cm in depth cover large areas of protected inshore waters of Bermuda. The present study was conducted to examine the production of Cladophora under a variety of light and nutrient conditions in order to isolate some of the environmental factors controlling its spread. Productivity of Cladophora was measured using the C-14 technique under field conditions. Production was calculated using data on biomass and C-14 uptake, and was found to average about 3.3 g C m-2 day-1 during December 1976 at an experimental site. The possible causes for the algal bloom are discussed and the rates of production related to known rates of other marine macroalgae.

Citation 25

BAHLOOL, B. BEN

Cawthron Inst., P. O. Box 175, Nelson, New Zealand

Nitrogen Fixation in Polluted Intertidal Sediments of Waimea Inlet, Nelson

N Z J Mar Freshwater Res

1978(Sept),12(3),271-275.

English

Nitrogen fixing potential was measured in summer 1975 by acetylene reduction in situ at 5 stations on the intertidal flats of the Waimea Inlet, Nelson, New Zealand, which receive nutrients from several sources. Highest values (644 umol. m-2. d-1) were obtained on sediments near an apple cannery effluent discharge and were linear through at least two tidal cycles. The cannery waste had the highest carbon to nitrogen ratio (10.3:1.0) of all the effluents examined and exhibited the highest rate of acetylene reduction (14.0 umol. l-1. d-1). Sizeable populations of the nitrogen fixing bacteria Klebsiella pneumoniae were isolated from the cannery effluent (2 x 10exp4 per millilitre) and also from the mud adjacent to the discharge pipe (5 x 10exp5 per millilitre). The simulatory effect of the cannery effluent on nitrogen fixation in the sediment was shown to be restricted to close to the discharge point. Sediments in areas affected by slaughterhouse and sewage effluents exhibited the second and third highest rates of acetylene reduction, (130 & 28 umol. m-2. d-1 respectively). In both places, the activities were not restricted to the immediate vicinity of the effluent channels. Nitrogen fixation was lowest in sediments fronting a catchment of grazed pasture. Fixation was low also in sediments affected by effluents from the hydraulic debarker of a woodchip mill.

Citation 26

BARBER, RICHARD T. , WILLIAM W. KIRBY-SMITH, PATRICIA E. PARSLEY

Duke Univ. Marine Laboratory, Beaufort, NC 28516

Wetlands Alterations for Agriculture

In: National Symposium on Wetlands, American Water Resources Ass. , Minneapolis, MN

in press

English

Since 1973 drainage of freshwater wetlands to create new farmland has increased in the South Atlantic region and the Lower Mississippi Valley. The conversion of wetlands to farmland destroys the wetland character of the land and puts stress on the remaining wetlands and estuaries that border the new farms. A study of one large wetlands drainage project in eastern North Carolina has demonstrated that after four years changes in nutrient loading and the salinity pattern have occurred in the shallow estuary that receives runoff from the new farmland. The magnitude of the changes is smaller where the runoff must percolate through an intact marsh border before it enters the estuary. While it appears inevitable that large-scale wetlands watershed conversions will deleteriously affect the receiving estuary, the changes can be somewhat ameliorated if the marsh border is used to process runoff from the new farmland.

Citation 27

BARD, HARRY, RICHARD G. KRUTCHKOFF

Virginia Polytechnic Inst. and State Univ. , Blacksburg, VA

Predicting Pollution in the James River Estuary. A Stochastic Model

VPI Water Resources Research Center Bulletin

1974, VPI-WRRC-Bull-70,147p.

English

Modeling the James River Estuary with the Schofield model was the major goal of the project. The model was set up for a 60 mile stretch of the estuary beginning at Richmond. Sensitivity studies involving rate constants, freshwater flow rate, sewage input, and water temperature were made and the results were analyzed. The average oxygen deficit concentration is insensitive to random water temperature, moderately sensitive to the sewage input rates investigated, and highly sensitive to changes in the organic carbon utilization rate constant. Ortho -

phosphate concentration is insensitive to changes of the phosphate utilization rate constant and ortho-phosphate, organic carbon, and organic nitrogen are insensitive to a difference in the freshwater flow as great as 40%. Finally, nitrate + nitrite concentration, bacteria growth, and algal growth are insensitive to a reduction of the nitrogen waste from the point sources. (Modified author abstract)

Citation 28

BARLOW, JOHN P. , CARL J. LORENZEN, RICHARD T. MYREN

Department of Conservation, Cornell Univ. , Ithaca, New York

Eutrophication of a Tidal Estuary

Limnol Oceanogr

1963,8(2),251-262.

English

The effect of heavy fertilization of the estuary of the Forge River on growth and photosynthesis of the phytoplankton has been studied over a 2-year period. Although there is distinct stratification in salinity, the nutrients added from the river are carried seaward by the circulation without significant tendency to accumulate in the deeper layer. Nearly all the large amounts of organic matter accumulated in the estuary can be accounted for as being produced locally by the dense populations of plankton algae both from the relation between chlorophyll a and organic matter, and from consideration of the rate of oxidation of allocthonous organic matter in the estuary. The region provides an unique environment for the growth of phytoplankton which is shown in the photosynthesis/respiration ratios, and in the rates of photosynthesis per unit of chlorophyll, or assimilation numbers, that have been observed.

Citation 29

BARRETT, M. J.

Water Pollution Research Lab. of the Dept. of the Environment, Elder Way, Stevenage, Hertfordshire

Predicting the Effect of Pollution in Estuaries

Proc R Soc Lond B Biol Sci

1972,180,511-520.

English

Mathematical models as aids to management and control of pollution in estuaries are discussed. Methods developed for predicting distribution of dissolved oxygen and ammoniacal and oxidized nitrogen in the Thames Estuary are briefly reviewed and short accounts of more recent developments in the work of the Water Pollution Research Laboratory on other estuaries are also given.

Citation 30

BARRICK, SUSAN O. , MAY B. DAW, PAMELA S. TENNYSON, FRANK W. WOJCIK, JOHN J. NORCROSS, WILLIAM J. HARGIS, JR.

Virginia Inst. of Marine Science, Gloucester Pt. , VA 23062

The Chesapeake Bay Bibliography, Vol. 1, The James River

VIMS

1971(June), Special Sci. Rep. No. 58.

English

A model bibliography of the James River has been constructed. It uses a subject index approach and includes references to the "grey literature" as well as to formal publications. Theses and dissertations, special reports and manuscripts are incorporated. All aspects (physical, chemical, and biological) of the James River are covered.

Citation 31

BATES, S. S.

City College of New York, Dept. of Biology

Effects of Light and Ammonium on Nitrate Uptake by Two Species of Estuarine Phytoplankton

Limnol Oceanogr

1976,21(2),212-218.

English

The incident light intensity, preconditioning light history, and the presence or absence of ammonium affected the rate of nitrate uptake by a chlorophyte and Skeletonema costatum isolated from the Hudson estuary. In the absence of ammonium, shade-adapted cells reached the highest maximum velocity of nitrate uptake. S. costatum had a lower half-saturation constant for light than the chlorophyte and reached a greater maximum velocity of nitrate uptake. In the presence of ammonium, nitrate uptake was depressed at all light intensities, but more in shade-adapted than in sun-adapted cells of both species, and more in S. costatum than in the chlorophyte. The maximum velocity of ammonium uptake was greater in shade-adapted than in sun-adapted cells. Since nitrate and ammonium uptake were related to the chlorophyll a content of the cell, energy for uptake was probably derived primarily from photosynthesis in the light but may also be derived from respiration since substantial dark uptake was observed, especially in S. costatum.

Citation 32

BECHTEL, TIMOTHY J. , B. J. COPELAND

Department of Zoology, North Carolina State Univ. , Raleigh, NC 27607

Fish Species Diversity Indices as Indicators of Pollution in Galveston Bay, Texas

Texas Insti Mar Sci, Contributions

1970,15,103-132.

English

Fish species diversity indices (natural bels/individual) calculated for both fish weights and numbers from trawl collections were found to be useful indicators of environmental and pollution stress in Galveston Bay, Texas. Diversity values ranged from 2.2 in the Houston Ship Channel. Thus it is demonstrated that the concept of using species diversity to indicate adverse water quality conditions is applicable to the higher tropic levels of an estuary. Significant differences were detected in diversity between areas of the bay within each sampling period except in winter as well as between seasons. Also, significant differences between the weight and number indices existed, indicating that both biomass and numbers of organisms should be utilized when studying the diversity of higher tropic levels. Correlation of diversity with percent waste water indicated that those areas receiving the greatest amounts of effluents and toxic materials (up to 86% of effluent by volume) exhibited the lowest mean annual diversities. Fish diversity in the Houston Ship Channel above Baytown, Texas can be used to predict diversity in the bay because of the linear relationship between distance and dilution of the ship channel effluent (19% effluent by volume calculated for Bolivar Roads). Sampling throughout the system indicated that the fish populations could be divided into somewhat separate communities, each structured as a response to environmental and pollution stress. In those areas receiving the greatest stress, the bay anchovy, Anchoa mitchilli, was the dominant species. These same areas also supported the fewest numbers of large individuals.

Citation 33

BELLA, D. A.

Oregon State Univ. , Corvallis, Dept. of Civil Engineering

Tidal Flats in Estuarine Water Quality Analysis

US Environmental Protection Agency

1975(June), EPA-660/3-75-025,184p.

English

The initial phases of the study involved mixing processes and tidal hydraulics; however, the study emphasis shifted to estuaries benthic systems as the importance of these systems became more apparent. A conceptual model of estuarine benthic systems was developed and a classification system of estuarine benthic deposits which is based on the availability of hydrogen acceptors and reactive iron was developed. Field studies demonstrated that estuarine sediments and overlying wastes could contain significant concentrations of free sulfides which are toxic to a variety of organisms. Field studies of benthic oxygen uptake and benthic sulfide release were conducted. Water quality profiles within the deposits also were determined. A number of laboratory studies were conducted to determine the rate of sulfate reduction. Results from experiments using extracts from benthic deposits and algal mats demonstrated a close relationship between the rate of sulfate reduction and the sulfate soluble organic carbon concentrations. A general systems model of estuarine benthic systems was developed. A variety of activities which could contribute to significant environmental changes with estuarine benthic systems were identified. Methods of determining dispersion coefficients from salinity profiles were examined and an improved method was developed. The build-up of a pollutant in the vicinity of the outfall during the slack water period of tide was studied through a field experiment and mathematical model.

Citation 34

BELLA, DAVID A. , WILLIAM E. DOBBINS

Stanford Univ. , Calif.

Finite-Difference Modelling of River and Estuary Pollution

Proceedings of the National Symposium on Estuarine Pollution, 23-25(Aug)1967

1967(Aug),612-645.

English

One dimensional dynamic model for describing the mass balance in an estuary is described. It is shown that the resulting differential equations are too complicated for analytical solution. Numerical solution techniques are presented.

Citation 35

BENEDICT, ARTHUR H. , ANDRE LESOUEF

Whiteley-Jacobsen and Assoc. , Seattle, WA

Assessing Nitrogen Contamination by Use of Differential Temperature Calculations

Water Res

1978,12,1107-1112.

English

A methodology to assess the relative influence of nitrogenous and carbonaceous oxygen requirements in the lower Aisne River, a subtributary of the Seine, was developed. This methodology utilizes the differential effect of temperature on biological oxidation rates to separate the influence of nitrogenous and carbonaceous oxygen use in the study area selected. The results obtained from this analysis indicate that nitrogenous oxidation potentially accounts for approximately 38% of the total oxygen demand requirements in the lower Aisne system.

Citation 36

BERG, R. H.

Seattle Univ. , Seattle, WA, Dept. of Civil Engineering

The Oxygen Uptake Demand of Resuspended Bottom Sediments

US Environmental Protection Agency, Water Pollut Control Res Ser

1970(Sept),16070 DCD, 38p.

English

The Warburg respirometer was used to evaluate the influence of light, sodium chloride, dilution salts, temperature, and agitation on the maximum oxygen uptake of disturbed estuarian benthos material. Temperature varied from 10 to 20C and the agitation settings from maximum to 25%. The variations in the initial uptake ranged from 2000 to 83,000 mg/l of oxygen/hr. Agitation alone caused a ten-fold increase in the maximum oxygen demand.

Citation 37

BIOME CO. , INC.

Surfside, CA

The Demonstration and Standardization of a Method for Monitoring the Ecological Effects of Marine Waste Discharges

Calif State Water Res Control Board

1974(Apr), Publication No. 54,96p.

English

An improved method for monitoring the effects of sewage outfalls and dispersion of effluents off the California coast consists of simple and inexpensive line buoys which permit exposure of ceramic panel substrates in ocean depths down to at least 200 feet. The substrates are nonpigmented ceramic panels 10 cm x 10 cm x 3/8 in. A 6 to 12-ft vertical interval was required to delineate the dispersion area during periods of complex stratification Four sets of buoy stations were deployed in the

Pacific Ocean for 92-day periods, approximately 4.5 miles offshore at the terminus of the Orange County Sanitation District's Ocean Outfall No. 2. Parameters derived from the biomass analysis included gross productivity, the absolute and relative frequences of some species and species groups, the relative chlorinated hydrocarbon levels, and the relative heavy metal levels. Productivity was equivalent to the biomass of the common hydroid, Obelia dichtoma. Gross productivity was inhibited in the waste dispersion field. Buoy station losses were 50% to 60% thus the number of stations deployed should compensate for losses. The float costs ranged between $30.00 for the largest to $20.00 for the smallest. The data from an adequate array of stations should make it possible to plot the mean position of the waste dispersion field.

Citation 38

BIOSPHERICS INC.

Rockville, MD

Study of the Possible Role of Pollution in the Prevalence of Sea Nettles in the Chesapeake Bay and the Development of a Census Taking Method

Biospherics, Inc.

1971(Oct), Final Rep. NASW-2115,135p.

English

The effect of pollutants on the polyp stage of the sea nettle, Chrysaora quinquecirrha, and a means to detect the medusae form by remote sensing were investigated. Phosphate, nitrate, ammonium, combinations of these, pH from 6-8, and synthetic sewage effluents were examined for maintenance and morphology of the polyps. Phosphate, nitrate, and their combinations were found to contribute to the proliferation of polyps, pH had no effect while ammonium, ammonium combinations and sewage were found to be detrimental to polyps. Phosphate and nitrate seemed to act as a protection against the lethal effects of ammonium. An assay based on the labeled release technique was used to measure polyp metabolism. The results support those obtained in the maintenance study suggesting a potential to predict and support the morphological effects of pollutants on polyps.

Citation 39

BLACK, R.

Fisheries Research Board of Canada, St. John's (Newfoundland), Biological Station

Growth Rates of Intertidal Molluscs as Indicators of Effects of Unexpected Incidents of Pollution

J Fish Res Board Can

1973,30(9),1385-1388.

English

Shells of mussels, Mytilus edulis, and periwinkles, Littorina littorea, from several locations were used to determine the effects of phosphorus pollution in Long Harbor, Newfoundland. Such effects were recorded using check marks on the shells. Examination of numerous shells indicated that check marks in both species were probably annual marks. Growth rates of Mytilus in 1969, the year of significant elemental phosphorus pollution at Long Harbour, were no different from those in preceding or succeeding years. No Littorina alive in 1969 occurred at Long Harbour, but they were abundant at other locations. This sort of analysis, used with caution because effects of pollutants may be confounded with effects of other variables, provides a method of examining nonlethal effects of unexpected polluting events.

Citation 40

BLEECKER, A. L.

Rutgers-the State Univ. , New Brunswick, NJ

Primary Productivity in Raritan Bay and its Relationship to Pollution

Rutgers-the State Univ.

1971, PhD Dissertation.

English

Citation 41

BLUMBERG, A.

National Oceanic and Atmospheric Administration, Princeton, NJ, Geophysical Fluid Dynamics Lab

Numerical Tidal Model of Chesapeake Bay

NOAA

1977(Jan), NOAA 04-022-33,1-10.

English

A two-dimensional plan view numerical model based upon the shallow water equations was developed to simulate the tidal dynamics of estuaries, rivers, and bays. The finite difference technique conserved mass, momentum (with no dissipation), and energy. The technique also allowed for easy employment of boundary conditions. The model was applied to the Chesapeake Bay with its varying bathymetry and many tributaries, showing the simulations predicting available observations. The presence of residual eddies was detected. Numerical simulations of the Bay demonstrated that the bottom friction value of Chezy's C equal to 63 was appropriate.

Citation 42

BLUMBERG, A. F.

National Oceanic and Atmospheric Administration, Princeton, NJ, Geophysical Fluid Dynamics Lab.

On the Dynamic Balance of the Chesapeake Bay Waters

Chesapeake Sci

1977(Sept),18(3),319-323.

English

An investigation into the dynamic balance of Chesapeake Bay waters was carried out by means of a two-dimensional, plan view numerical model. The results of the investigation showed that neither the Coriolis force nor the advective terms in the governing vertically integrated equations can be neglected without changing the tidal dynamics and circulation patterns of this Bay. Also, a bottom friction coefficient of 0.0025 produces the most realistic simulations of observed tidal data.

Citation 43

BOWDEN, WILLIAM B. , JOHN E. HOBBIE

North Carolina State Univ. , Raleigh. Dept. of Zoology, NC

Nutrients in Albemarle Sound, North Carolina

Sea Grant pub.

1977(Apr), UNC-SG-75-25,202p.

English

The quality of water and degree of eutrophication were measured in Albemarle Sound, a large oligohaline sound in North Carolina. The patterns of nutrient concentration over time in Albemarle Sound were similar to those found in the near-by Tar - Pamlico and Neuse River systems, with some exceptions. Although nutrients seem to be abundant, algal bloom conditions were surprisingly infrequent. At present the sound is healthy with few signs of excessive eutrophication. However, the Albemarle Sound watershed is a rapidly developing region. Increased non -point source pollution from second-home developments or reduced turbidity as a result of dams could rapidly accelerate the eutrophication process in this system.

Citation 44

BOWER, C. E. , J. P. BIDWELL

Sea Research Foundation, West Hartford, CT, Inst. for Aquarium Studies

Ionization of Ammonia in Seawater: Effects of Temperature, pH, and Salinity

J Fish Res Board Can

1978,35,1012-1016.

English

Previous studies have shown that the toxicity of ammonia to freshwater fishes depends on the ambient concentration of the un-ionized fraction (NH(3)) and have quantified the percent NH(3) in solution as a function of temperature and pH. If NH(3) is also toxic to marine fishes, the effect of salinity on the ionization of ammonia must also be considered. The percent NH(3) over ranges of temperature, pH, and salinity common in seawater-culture situations is presented here.

Citation 45

BRAY, J. T.

Johns Hopkins Univ. , Baltimore, MD

Behavior of Phosphate in the Interstitial Waters of Chesapeake Bay Sediments

Johns Hopkins Univ.

1973, Rep. C00-3292-7,167p.

English

Determinations of dissolved inorganic phosphate concentrations and a number of related chemical parameters were made on interstitial water from Chesapeake Bay sediments. The activities of dissolved phosphate and Fe^{2+} are covariant and are described satisfactorily by an equilibrium model involving the mineral vivianite $Fe_3(PO_4)_2,3H_2O$. The presence of sedimentary vivianite, which leads support to the equilibrium model, is demonstrated by x-ray diffraction techniques. Interstitial water of Chesapeake Bay sediments contains large quantities of dissolved inorganic phosphate. Estimates of the diffusional flux of phosphate indicate that the release of phosphate from the sediments has little effect on the overlying water. Oxidation during sampling procedures decreases the inorganic phosphate concentrations in interstitial water rich in Fe^{2+}. All sampling and analytical procedures must be carried out in an inert atmosphere.

Citation 46

BRAY, J. T. , O. P. BRICKER, B. N. TROUP

Dept. of Earth and Planetary Sciences, Johns Hopkins Univ. , Baltimore, MD 21218

Phosphate in Interstitial Waters of Anoxic Sediments: Oxidation Effects during Sampling Procedure

Science

1973,80,1362-1364.

English

Oxidation during sampling procedures significantly decreases the inorganic phosphate concentrations of interstitial water rich in iron (II). All sampling and analytical procedures must be carried out in an inert atmosphere. Orthophosphate in the interstitial water of Chesapeake Bay sediments, in equilibrium with vivianite, is a potential nutrient source for the overlying water.

Citation 47

BREHMER, MORRIS L. , SAMUEL O. HALTIWANGER

Virginia Inst. of Marine Science, Gloucester Point, VA

A Biological and Chemical Study of the Tidal James River

VIMS, SRAMSOE

1966(Nov), No. 6,104p.

English

Biological, chemical, and physical data were recorded from ten stations on the James River from May 1965 to May 1966. Those parameters measured were depth, salinity, temperature, DO, alkalinity, pH, chlorophyll, PN, NO3, NO2 and phosphorus. From the pollution standpoint, the critical area in the James River extends from Richmond to Brandon Point, a distance of 48 nautical miles. The phytoplankton standing crop frequently exceeds 50 ugl-1. Values exceeding 100 ugl-1 were recorded on one cruise. An algal scum was frequently observed during the late summer months. The phosphorus and nitrogen data indicate that the 48-mile critical area is highly enriched. Nitrate-nitrogen values as high as 231 ug-at l-1 and soluble reactive phosphorus values as high as 12.60 ug-at l-1 were recorded during the study. The nutrient elements could not be followed through the estuarine portion and the phytoplankton population in the lower area did not reflect that the high level of enrichment existed upstream.

Citation 48

BREZONIK, PATRICK L.

Dept. of Environmental Engineering, Univ. of Florida, Gainesville, FL

Nitrogen: Sources and Transformations in Natural Waters

In: Nutrients in Natural Waters, Wiley-Interscience, Div. of John Wiley and Sons, Inc. NY, NY

1972, Chapt. 1.

English

Of the major nutrient cycles in natural waters, the nitrogen cycle is perhaps the most interesting, the most complex and the least understood from a quantitative point of view. The geocycle of nitrogen is largely a biochemical phenomenon; in natural waters it is nearly wholly so. Thus the nitrogen cycle, like the carbon and phosphorus cycles, is inextricably related to aquatic organic productivity. Although many elements and compounds are required for biosynthesis, nitrogen and phosphorus have long been considered to be the principal limiting nutrients for primary production; evidence lately obtained suggests that carbon may also limit production in some situations. The great recent concern over cultural eutrophication has stimulated much new research in the following areas: the chemistry and biochemistry of nutrients in aquatic systems, the quantification of the sources and sinks of nutrients, and the dynamics of nutrient uptake and release. In this chapter we discuss these subjects with respect to the cycle of nitrogen in natural waters.

Citation 49

BREZONIK, PATRICK L.

US Environmental Protection Agency

Nitrogen Sources, Cycling in Natural Waters

US EPA

1973 (July), EPA 660/3-73-002

English

Sources of nitrogen were reviewed to determine their significance in lacustrine budgets. Nutrients in rainfall were found significant although their variability obviates precise conclusions. Using literature values for nutrient export from various land uses, nutrient budgets were calculated for 55 Florida lakes. Critical N and P loading rates (above which eutrophication is likely) were estimated from the calculated budgets and lake trophic conditions. Algal fixation in two trophic Florida lakes was studied in detail; the total annual N fixed and factors affecting the occurrence of fixation were evaluated. A survey of fixation in 55 Florida lakes showed significant fixation in only eutrophic lakes. Bacterial fixation in the hypolimnion of a small lake contributed substantial nitrogen to the lake, and nitrogen fixing activity was found in both estuarine and lacustrine sediments. The acetylene reduction assay for N fixation was evaluated; short incubations were found essential. Reduction was light dependent and N2 acted as a competitive inhibitor. A preliminary experiment suggested that lacustrine sediments acted as ammonia buffers; estuarine sediment sorbed ammonia strongly with little tendency to release ammonia to the water. Inferences from high organic color were evaluated for automated inorganic N and P analytical methods. Various amino acids were also shown to interfere with the indophenol ammonia procedure.

Citation 50

BRINDLE, J. R. , M. D'AMOURS

Universite du Quebec a Rimouski, Que. (Canada), Section d'Oceanographic

Seasonal Distribution of Nutrients in the Vicinity of Rimouski

Cah Inf Sect Oceanogr Univ Que Rimouski

1977(Nov), No. 1,39p.

French

Between August 1973 and October 1974 a monthly analysis was made of temperature, salinity, silicates, ammonia, urea, nitrite, nitrate, organic and total nitrogen, phosphate and organic and total phosphorus, in a section of the St. Lawrence estuary. Data indicate two periods of bloom, one in June-July, the other in September-October, while in winter concentrations of nutrients at the surface are at a maximum. There is evidence of believing that a cycling of organic and inorganic matter occurs. In summer nutrients decrease with depth. There is a relative increase in concentration from the north bank to the south bank each month, confirming the importance of the riverine flow of the Rimouski and Metis rivers.

Citation 51

BRINN, DAVID G.

British Steel Corp. , England, Strip Mills Div.

A Select Bibliography on Pollution of Estuaries and Coastal Waters with Particular Regard to Industrial Effluents

BISRA, London

1972(Aug), SM/BIB/785,6p.

English

This bibliography on water pollution has 34 references, divided into 5 sections; General Papers, Ecological Considerations, Eutrophication and Nutrient Cycles, Investigations in U. K. Locations, Investigations in Foreign Locations.

Citation 52

BRISTOW, J. W. , A. A. CROWDER, M. R. KING, S. VANDERKLOET

Queen's Univ. , Kingston (Ontario), Dept. of Biology

The Growth of Aquatic Macrophytes in the Bay of Quinte Prior to Phosphate Removal by Tertiary Sewage Treatment (1975-1976)

Le Nat Can

1977,104,465-473.

English

In a study of the distribution of aquatic macrophytes in the Bay of Quinte (southeastern Ontario), fewer species and a lower density of cover were recorded in the upper portion of the Bay. Biomass was generally low. The poorer macrophyte growth in the shallow nutrient-rich upper Bay was probably a result of algal blooms and high turbidity of the water, but the absence of suitable substrate might also be a contributing factor. The lower Bay was similar to adjacent areas of Lake Ontario in species composition and density of plant cover.

Citation 53

BROOKS, KEITH M.

Interstate Commission on the Potomac River Basin, Bethesda, MD

Critical Areas in the Potomac River Basin: A Mid-1977 Review of Water Pollution Control

Interstate Commission on the Potomac River Basin, Bethesda, MD

1977(Dec), Technical Pub. 77-3,83p.

English

Citation 54

BROWN, L. , E. G. BELLINGER

Victoria Univ. of Manchester (England), Pollution Research Unit

Nitrate Determination in Fresh and Some Estuarine Waters by Ultraviolet Light Absorption: a New Proposed Method

Water Res

1978,12(4),223-229.

English

The new proposed uv resin technique for nitrate determination is either not affected by, or can allow for, the following interfering chemicals at levels occurring in natural polluted or unpolluted waters: chloride, phosphate, sulphate, carbonate/bicarbonate, bromide, nitrite, colored metal complexes, humic acids, ammonium, dyes, detergents, phenol, and other uv absorbing organics. The method is quick and has an accuracy of + or -3%. Concentration of the sample to determine lower levels by evaporation is feasible with certain upland waters but should not be attempted if the sample has a high humic acid concentration. The technique can be used only in nitrate rich estuarine and coastal waters because the lower limit of detection is raised to 0.5 mg/l when the sample is diluted to remove bromide interference.

Citation 55

BROWN, R. J.

National Technical Information Service, 5285 Port Royal Rd. , Springfield, VA

Sewage Effects in Marine and Estuarine Environments. Volume 2.1977-May 1978

NTIS

1978, NTIS/PS-78/0559,55p.

English

This updated bibliography contains abstracts relating to the effects of sewage effluents and sludge on marine and estuarine environments, especially their ecology. The effects on marine plants and animals and problems associated with ocean dumping, water chemistry, dispersion studies, etc, are covered in the cited references.

Citation 56

BROWN, ROBENA J.

National Technical Information Service, 5285 Port Royal Rd. , Springfield, VA 22161

Water Pollution in Estuaries and Coastal Zones (A Bibliography with Abstracts)

NTIS

1975(Sept), NTIS/PS-75/698

English

This bibliography contains selected abstracts of research reports covering studies dealing with water pollution from estuarine and coastal development, the effects of this pollution, and its control. The reports are general in nature so as to be of interest to any coastal area. The topics include pollution as related to urbanization, government actions, coastal planning, natural resource development, and sewage and solid waste disposal. Specific biological and oceanographic studies have been excluded. (Contains 214 abstracts)

Citation 57

BROWN, ROBENA J.

National Technical Information Service,5285 Port Royal Rd. , Springfield, VA 22161

Water Pollution in Estuaries and Coastal Zones, Vol.2,1975-Sept 1976

NTIS

1976(Nov), NTIS/PS-76/0852

English

The bibliography contains selected abstracts of research reports covering studies dealing with water pollution from estuarine and coastal development, the effects of this pollution, and its control. The reports are general in nature so as to be of interest to any coastal area. The topics include pollution as related to urbanization, government actions, coastal planning, natural resource development, and sewage and solid waste disposal. Specific biological and oceanographic studies have been excluded. (This updated bibliography contains 145 abstracts,96 of which are new entries to the previous edition.) See also NTIS/PS-76/0851, Water Pollution in Estuaries and Coastal Zones. Vol.1 1964-1974.

Citation 58

BUCK, J. D.

Connecticut Univ. , Storrs Inst. of Water Resources

Sedimentation and Microbial Metabolism in a Shallow Estuary

Connecticut Univ.

1978, Completion Rep. OWRT A-069-CONN(1)/14-31-001-6007,27p.

English

A pristine, forested coastal watershed (18 km) in southern New England was studied for three years to determine (1) the effect of a small (22 ha) drinking water reservoir on nutrient and water runoff, and (2) the relative importance of the watershed in supplying organic sediment to the receiving estuary (29 ha). Organic and inorganic freshwater runoff data were supplemented with estuarine sedimentation rate data to construct a first-order organic supply budget for the estuary. The reservoir system retained significant amounts of dissolved and particulate organic carbon and N03-N, but O-PO4-P runoff was unaffected. Lentic conditions in the reservoir allowed for substantial amounts of primary production by photoplankton which reduced N03-N export to the estuary by a third. Freshwater delivery of particulate organic matter to the estuary equaled the amount from marine sources which was collected in sediment traps (c. 23 mol organic carbon/sq m/yr). Total deposition of organic material in the estuary was estimated to range between 120 and 300 mol/sq m/yr, mostly from estuarine primary production. Investigations of the chemistry of the interstitial pore waters of the estuarine sediments showed that organic matter deposition rates and the ambient hydrologic regime induce facultative and anaerobic metabolism by the microflora. A sensitive assay of total biological metabolism using tetrazolium salts is being developed to (1) obtain estimates of aerobic and anaerobic metabolism and, (2) complete a first-order organic matter supply and demand model for this aquatic/marine system.

Citation 59

BURKHOLDER, PAUL R. , LILLIAN M. BURKHOLDER

Dept. of Bacteriology, Univ. of Georgia, Athens, GA

Vitamin B12 in Suspended Solids and Marsh Muds Collected Along the Coast of Georgia

Limnol Oceanogr

1956,1(3),202-208.

English

Vitamin B12 content of suspended solids in river and sea waters and in marsh muds, collected along the coast of Georgia, was determined by means of the E. coli mutant assay. Appreciable amounts of vitamin B12 carried on suspended particles of river water, the brown water types showing highest concentrations, up to 6.4 ug per gram of solids. Vitamin B12 content of particulate matter in the sea waters varied over the range 0.0027 to 0.130 ug per liter. Calculated in relation to dried solids, the highest concentration of B12 was 0.736 ug per gram of solids. Considerable variations were found at different times, stations, and depths. Samples of suspended matter taken from the Duplin River at different phases of the tide showed maximal values of B12 up to about 0.06 ug per liter, on the outgoing tide. In settling experiments it appeared that a major portion of B12 is correlated with the organic fraction of solids in sea water. Enrichment cultures showed large increases of vitamin B12 produced by microorganisms in marine muds and waters. Many isolated bacteria were grown on extracts of marsh grass and found to produce significant quantities of the vitamin. It is concluded that suspended particles are important in the vitamin nutrition of the sea and that bacteria are significant producers and carriers of vitamin B12 in the marine environment.

Citation 60

BUTTERMORE, R. E.

Univ. of Tasmania, Dept. of Zoology, G. P. O. Box 252C, ; Hobart, Tasmania, 7001, Australia

Eutrophication of an Impounded Estuarine Lagoon

Mar Pollut Bull

1977(Jan),8(1),13-15.

English

A small lagoon to the east of Hobart is cut off from a larger body of tidal salt water by a causeway, allowing only a limited tidal interchange. Primary treated effluent from a small township is discharged into the lagoon. Causes for noxious odours emanating from the lagoon were investigated. It was found that the effluent, combined with agricultural runoff, has accelerated eutrophication. Wide variations in temperature and salinity occur. Decomposing algal mats account for most of the odours, while rooted aquatics and molluscs appear to play only a small part. Proposed remedies will be costly and still might not achieve their objective.

Citation 61

CALIFF, J. M. , JR.

Stanford Univ. , Stanford, CA, Dept. of Civil Engineering

An Approach for Involving Local Officials and Citizens in Regional Water Quality Studies

Engineering-Economic Planning Program

1971, Publication No. EEP-44,197p.

English

A case study is made of the 'Bay-Delta Program', a three-year water quality study of the San Francisco Bay-Delta area completed in 1969. Methods for local involvement used in that study are described, along with results of a detailed mail survey distributed to local officials. The survey focuses on local opinions concerning the value of the public involvement procedures used and on local attitudes toward alternative methods. Based on the above findings and a literature survey, guidelines for developing local liaison procedures are formulated.

Citation 62

CALIFORNIA UNIV.

San Diego, La Jolla, Inst. of Marine Resources

Eutrophication in Coastal Waters: Nitrogen as a Controlling Factor

US Environmental Protection Agency

1971(Dec), Water Pollut Contr Res Ser EPA 16010 EHC 12/71,67p.

English

The Southern California coastal sewage outfalls were investigated in relation to their effect upon standing stocks of phytoplankton, and on primary production, during two cruises in July 1970 and June 1971. Kinetic parameters for the assimilation of ammonium, nitrate, and urea were determined at the outfall sites using N-15 labeled substrates. Laboratory studies investigated the utilization of various forms of nitrogen by phytoplankton, mechanisms and rates of nitrogen assimilation, and enzymes of nitrogen assimilation. Ammonium and nitrate assimilation were found to vary from day to night as does the capacity for photosynthesis when cultures were grown on light dark cycles simulating natural illumination. In fitting data on rates of nitrogen assimilation vs. concentrations of nitrogen to the Michaelis-Menten equation, modified to describe nutrient uptake, it was found that the maximum growth rate was a variable, while the saturation constant was uniform over a range of dilution rates of N-limited chemostat cultures. The chemical composition of phytoplankton, particularly ratios of carbon/chlorophyll and carbon/nitrogen, varied with dilution rate in reproducible ways. By varying the dilution rate of such cultures one seems to regulate the degree of nitrogen-deficiency of the phytoplankton.

Citation 63

CAMBRIDGE, M. I.

Western Australia Univ. , Nedlands, Dept. of Botany

Seagrasses of South-Western Australia with Special Reference to the Ecology of Posidonia australis Hook F. in a Polluted Environment

Aquatic Bot

1975(June),1(2),149-161.

English

New ecological data, including soil types, growth patterns, seasonal changes, and reactions to pollution are given for the nine species of seagrasses of south western Australia, with special references to Posidonia australis in Cockburn Sound, a polluted marine environment.

Citation 64

CAPERON, JOHN , S. A. CATTELL , GEORGE KRASNICK

Hawaii Inst. of Marine Biology, P. O. Box 1346, Kaneohe 96744

Phytoplankton Kinetics in a Subtropical Estuary: Eutrophication

Limnol Oceanogr

1971,16(4),599-607.

English

On each of a 4-month series of weekly cruises in Kaneohe Bay, Oahu, Hawaii, in vivo chlorophyll a was monitored continuously by fluorometry, and at 8 stations discrete measurements of chlorophyll a (trichromatic method), primary productivity (C14), and nutrients (nitrate and phosphate) were made. The results are compared with similar data collected a decade earlier in the bay to investigate the enrichment effects of increased waste discharge over this period. The south sector of the bay, site of two sewage outfalls, showed the greatest population instability and had the highest concentrations of chlorophyll a, nitrate, and phosphate, as well as the highest primary productivity. Chlorophyll, nutrient concentration, and primary productivity decreased through the transition sector into the north sector of the bay, which is farthest removed from the waste discharge points. The productivity index (mg C fixed hr-1 mg Chl a-1) showed no such south to north differences. A model of a simplified food chain using a hyperbolic relationship between uptake rate and substrate concentration is postulated to explain the dynamics of the plankton community in the bay.

Citation 65

CAPERON, JOHN, WAYNE A. HARVEY, FRANCES A. STEINHILPER

Univ. of Hawaii, Dept. of Oceanography, Correa Road,
Honolulu, HI 96822

Particulate Organic Carbon, Nitrogen, and Chlorophyll as Measures of Phytoplankton and Detritus Standing Crops in Kaneohe Bay, Oahu, Hawaiian Islands

Pac Sci

1976,30(4),317-327.

English

Data are presented to show that the Kaneohe municipal waste discharge into the southeastern corner of Kaneohe Bay gives rise to high concentrations of particulate organic matter and chlorophyll-a. The data cover a period of 4.5 years and show a continuing increase in particulate organic matter and chlorophyll-a and a significant increase in the particulate organic nitrogen/carbon ratio. It is shown that regression analyses of particulate organic carbon and nitrogen on chlorophyll-a can be used to estimate the phytoplankton and the detritus carbon and nitrogen concentrations in surface water samples from the eutrophic southeastern section of the bay. The differences in regression analyses results on samples from eutrophic waters as opposed to those from oligotrophic waters are discussed.

Citation 66

CARPENTER, EDWARD J.

Woods Hole Oceanographic Inst., MA

Effects of Phosphorus Mining Wastes on the Growth of Phytoplankton in the Pamlico River Estuary

Chesapeake Sci

1971,12(2),85-94.

English

To test the effects of P mining waste water (SPW) and domestic sewage on the growth of phytoplankton in the Pamlico River estuary, six 1400 cu m artificial estuaries and eight 15 cu m plastic pools were constructed. Measurements of phytoplankton biomass and abundance of blue-green algae were made at regular intervals in estuaries and pools that contained various concentrations of SPW and artificial sewage. Concentration (excluding controls) of SPW in the pools was 1% and in the estuaries ranged from 2% to 8% of the total water volume. The concentration of an artificial sewage mix in the pools was 0.1% v/v. The present-day concentration of SPW in the lower Pamlico River is about 0.7% v/v and is expected to rise as other companies begin mining operations. Two experiments were carried out, one (44 days long) in the estuaries and one (36 days long) in the plastic pools. The experiments gave evidence that the addition of SPW to estuarine water does not immediately increase the biomass of the phytoplankton. This is most likely because P apparently does not limit the growth of phytoplankton in the river. As shown in a study that took place in late summer, N limited the algal photosynthesis in the Pamlico estuary. However, blue-green algae cell numbers (Anabaena sp. and Spirulina sp.) were 77.2% higher ($0.010<p<0.025$) than controls in estuaries containing approximately 8% SPW v/v. Although cell numbers were 33.2% above controls in estuaries with 2% SPW v/v, the difference was not statistically significant at the 5% level. Also, blue-green algae (Anabaena torulosa) numbers were 404% higher ($0.010<p<0.025$) than controls in plastic pools with 1% SPW v/v and 295% above ($0.010<p<0.025$) controls with 1% SPW and 0.1% artificial sewage. The growth of blue-green algae was probably stimulated by the addition of P in the SPW, and their nitrogen fixing ability allowed them to obtain sufficient N in waters where this nutrient is otherwise limiting. (abbrev.)

Citation 67

CARPENTER, J. H. , D. W. PRITCHARD, R. C. WHALEY

Chesapeake Bay Inst. , Johns Hopkins Univ. , Baltimore, MD

Observations of Eutrophication and Nutrient Cycles in Some Coastal Plain Estuaries

Johns Hopkins Univ, (CBI), or IN: Eutrophication, Proc. Symp. Sherry, Sol et al. (edited by). National Research Council. Publ No. 1706 Thrombosis. x + 762p. illus. National Academy of Sciences: Washington, DC, 1969

1969, CBI Contribution No. 108,210-221.

English

Distribution of nitrogen and phosphorus compounds in the northern half of the Chesapeake Bay and in the Potomac River downstream from Washington, DC , have been observed for the past several years during monthly cruises conducted by the Chesapeake Bay Institute. Measured at each station were temperature, salinity, dissolved oxygen, pH, alkalinity, chlorophyll, transparency, inorganic phosphate, total filtrate phosphate, total phosphate, nitrate, nitrite, ammonia, total nitrogen, productivity, and counts of net phytoplankton and zooplankton. The purpose of these surveys was to determine existing conditions and nutrient levels in order to provide a basis for considering permissible increases in nutrient discharges or, in some areas, desirable reductions.

This paper is a review of the salient features of the observed distributions.

Citation 68

CARTER, H. H. , R. J. REGIER

Marine Sciences Research Center, State Univ. of New York,
Stony Brook, NY 11794

A Physical Assessment of the Maryland Coastal Waters to Receive Wastewater

Chesapeake Bay Inst., The Johns Hopkins Univ.

1978(May), Special Rep. 62,92p.

English

This report describes a physical study of the Maryland seacoast carried out during July and August of 1977; its overall objective was to identify and rank outfall corridors along the Maryland seacoast suitable for the disposal of an estimated 1.31 m3s-1 (30 x 10exp6 gallons/day) of sewage effluent from the North- Central Ocean Basin by 2000. In order to accomplish this objective, we (1) measured the far-field dilutions of the primary effluent presently being discharged through the existing Ocean City outfall/diffuser at 64th Street with a dye tracer technique, (2) measured the currents, temperatures, and salinities at three locations (one (Station "N") off 64th Street (Fenwick Island), a second (Station "MID") off the Ocean City Airport (Assateague Island), and a third (Station "S") off the Assateague Island State Park)) for the purpose of examining the uniformity of the nearshore waters, (3) developed additional data on the dispersive characteristics of the nearshore region off the Maryland seacoast by means of three instantaneous dye tracer releases, and (4) carried out additional bathymetric surveys off Assateague Island. (abbrev. summary)

Citation 69

CHAN, KWONG-YU, K. H. WONG, P. K. WONG

Dept. of Biology and Dept. of Chemistry, The Chinese Univ. of Hong Kong, Shatin, NT, Hong Kong

Nitrogen and Phosphorus Removal from Sewage Effluent with High Salinity by Chlorella salina

Environ Pollut

1979,18,139-

English

Cells of Chlorella salina CU1 are able to grow well in domestic sewage effluent having salinities as high as 16 ppt. By using controlled C. salina CU1 cultures, it is possible to remove the nitrogen and phosphorus from the sewage effluent before it is discharged into marine coastal water. With a retention time of 8 days, 86% to 100% NH3-N, 98% NO3-N and 98% PO4-3-P are removed from the sewage effluent under laboratory conditions. It is also found that cells of C. salina CU1 prefer ammonia to nitrates as nitrogen source. Uptake of nitrates by the cells occurs only after the ammonia in the sewage effluent has been reduced to levels below 0-5 ppm. Ammonia at high concentrations completely inhibits the nitrate uptake by the algal cells. Since cells of C. salina CU1 have a high protein content (44%), it is proposed that this unicellular green alga can be used to serve the dual function of wastewater purification and waste recycling through the production of algal protein from sewage effluent having high salinities.

Citation 70

CHAPMAN, A. R. O. , J. W. MARKHAM, K. LUNING

Dept. of Biology, Dalhousie Univ. , Halifax, Nova Scotia, Canada B3H 4J1

Effects of Nitrate Concentration on the Growth and Physiology of Laminaria saccharina (Phaeophyta) in Culture

J Phycol

1978,14(2),195-198.

English

Laminaria saccharina Lamour. sporophytes were grown in enriched and synthetic media through a range of nitrate concentrations. There was an approximately linear relationship between growth and nutrient concentration up to 10 uM substrate concentration. The half-saturation constant (Ks) was ca. 1.4 uM NO3-. The internal levels of NO3- increased at substrate concentrations above 10 uM NO3- and reached levels several thousand times higher than the surrounding medium. Thus there is evidence for luxury consumption of NO3-. The chlorophyll content and photosynthetic capacities of plants also increased with increasing external NO3-. The ecological implications of this work are considered.

Citation 71

CHEN, CARL W. , GERALD T. ORLOB

Water Resources Engineers, Inc. , Walnut Creek, CA

Ecologic Simulation for Aquatic Environments

Water Resources Engineers, Inc.

1972 (Dec), Final Rep. No. 1-0500,168p.

English

A mathematical model for computer simulation of aquatic ecosystems was developed and adapted to lake and estuarial systems. The model is capable of simulating the annual cycle of ecologic successions involving algae, bacteria, zooplankton, fish and benthic animals and the interdependent relationships between biota and abiotic substances carried in the natural aquatic system. It is water quality oriented, predicting the temporal and spatial distributions of temperature, dissolved oxygen, biochemical oxygen demand, pH, conservative constituents (e. g. , salinity, TDS, etc.), toxicity, nitrogen (three forms), carbon dioxide, and phosphorus as well as the biomass of each trophic level in the system. The basic formulations in the model are based on kinetic principles and the law of Conservation of Mass. Algal growth kinetics are governed by a Michaelis-Menton relationship including light, temperature, carbon, nitrogen and phosphorus.

Citation 72

CHESAPEAKE RESEARCH CONSORTIUM, INC.

Baltimore, MD

Annual Technical Report, Volume V. Emissions and Additions: Biological Transfers and Effects of Waste Components

CRC

1973(May), CRC-PUB-24, NSF/RA/E-73/513,169p.

English

The components of sewage effluents in the dissolved or particulate state are available for utilization by or impact upon the biological components of the receiving system. The known effects include stimulation, inhibition, and biological transfers within and transport from the system or to sediments. Before distant or regional effects of sewage treatment outfalls can be adequately predicted, biological transfers within and transport from the estuarine system must be better understood. To this end the following subjects are studied and the results presented: the estuarine food chain; community analysis of the phytoplankton of an estuarine ecosystem; the zooplankton of lower Chesapeake Bay; autotrophic and heterotrophic phosphorus metabolism in microbial communities; the relation of benthic and certain planktonic algae to nutrient loading in Chesapeake Bay and its tributaries; microbiological modifications of biocides and hazardous chemicals in sewage effluents; population ecology of foraminifera; effects of Tropical Storm Agnes on macrobenthic communities of lower Chesapeake Bay; oxygen requirements; and the biological aspects of trace metals in the Chesapeake Bay.

Citation 73

CHESAPEAKE RESEARCH CONSORTIUM, INC.

1419 Forest Drive, Suite 207, Annapolis, MD 21403

Chesapeake Bay Baseline Data Acquisition, Appendix IV. Eutrophication

CRC

1978(Aug),347p.

English

This report comprises three sections as follows: Annex I. contains scientists presently engaged in research in this field. Annex II. is an indexed listing of data files pertinent to the Chesapeake Bay and adjacent coastal states. Annex III. summarizes the monitoring efforts as derived from Annex II. The source material for appendices IV-XI includes minimal material based on interviews, field work and verification. Efforts were directed to determining reseachers and their activities from "A Chesapeake Bay Directory" only. For each of the eight subject areas, a key word list was also formulated and the respective pertinent data files compiled from the Environmental Data Base

Directory. These files served as the primary source for the monitoring programs section.

Citation 74

CHESAPEAKE RESEARCH CONSORTIUM, INC.

1419 Forest Drive, Suite 207, Annapolis, MD 21403

Chesapeake Bay Baseline Data Acquisition, Appendix. VII. Modification of Fisheries

US EPA

1978(Sept), EPA/903/9-78/027,289p.

English

This report identifies researchers conducting current research programs relating to modification of fisheries in the Chesapeake Bay estuarine system. The data files included in this report are compiled from the Environmental Data Base Directory and reflects data applicable to modification of fisheries from 1973 to the present. The report also identifies the major past, present, or planned monitoring efforts.

Citation 75

CHRISTIAN, ROBERT R. , RICHARD L. WETZEL

Dept. of Biological Sciences, Drexel Univ. , Philadelphia, PA

Interaction between Substrate, Microbes, and Consumers of Spartina Detritus in Estuaries

In: Estuarine Interactions, edited by Martin L. Wiley, Academic Press

1978,93-113.

English

A review of recent literature has indicated that the classic view of estuarine detritus food webs is simplistic. The dynamics of the detritus microbial complex is best understood when consideration is given to each component and its interactions, rather than merely considering the complex as a whole. This is true not only in determining the fate of the detritus substrate, but also in predicting the availability of microbes to consumers. Partitioning of detritus substrate, microbe, and consumer components was made in a simple, theoretical simulation model. The importance of the partitioning was demonstrated in 1) the energetics of trophic relationships between substrate, microbes, and the consumer sink; 2) the heterogeneity of microbial attachment in time and space; and 3) consumer requirements for energy and nutrients.

Citation 76

CHRISTIE, N. D. , A. MODLAN

Cape Town Univ. (South Africa), Dept. of Zoology; and Dept. of Planning and the Environment, Capetown (South Africa)

Effects of Fish Factory Effluent on the Benthic Macrofauna of Saldanha Bay

Mar Pollut Bull

1977(Feb),8(2),41-45.

English

A survey was conducted adjacent to a pelagic fish canning factory in Saldanha Bay, South Africa, to determine the effects of effluent on the benthic macrofauna. Pairs of samples were taken using Scuba diving techniques at each of five stations situated at increasing distances from the factory. The benthic macrofauna was analysed using numerical methods of classification and ordination thereby defining three groups of stations. The macrofauna nearest the factory was impoverished T°:h several species having only small individuals but with distance from the factory species richness, species density, density of individuals and ash-free biomass increased. Although conditions adversely affected some of the macrofauna at the five stations, the situation has undoubtedly improved since June 1972, when a high benthic mortality occurred.

Citation 77

CLARK, JOHN, W. G. SMITH, ARTHUR W. KENDALL, JR. , MICHAEL P. FAHAY

National Marine Fisheries Service, Highlands, NJ, Sandy Hook Marine Lab

Studies of Estuarine Dependence of Atlantic Coastal Fishes

Bureau Sport Fish Wildl

1969(Aug), Technical Paper No. 28,132p.

English

The extent that migratory fishes of the Atlantic coast depend on estuaries as essential habitat during the early stages of their lives and the effects on fishes from physical disruption and pollution of estuaries caused by twenty years of coastal development was studied by the Sandy Hook Marine Laboratory. The basic data from a series of surveys, eight cruises of the research vessel Dolphin, from Cape Cod, Massachusetts to Cape Lookout, North Carolina during a one year period from December 65 to December 66 is reported. The data includes temperatures, salinities, zooplankton volumes, and the midwater trawl collections of fishes.

Citation 78

CLARK, L. J. , K. D. FEIGNER

US Environmental Protection Agency, Annapolis Field Service Office, Annapolis, MD

Mathematical Model Studies of Water Quality in the Potomac Estuary

US EPA

1972(Mar), Technical Rep. No. 33,174p.

English

Mathematical models are becoming an increasingly important 'tool' for predicting, under a variety of conditions, water quality behavior in an estuary. The report presented recent Annapolis Field Office studies on use of models in the Potomac Estuary, specifically, the Thomann Model (time-dependent version) and the FWQA Dynamic Estuary Model. Numerous computer runs were made with both models in an attempt to make a reasonably accurate simulation of dye profiles observed in the Potomac Estuary following a 13-day continuous release during November 1969 and of observed dye profiles in the Anacostia River following a 7-day continuous release during April 1970. In addition to model verification, consideration was given to: (1)a comparison of modeling approaches, (2)the limitations of each model, (3)input data requirements, and (4)a detailed sensitivity analysis to determine which input parameters had the greatest effect on model output. While mathematical models have been developed for the entire Potomac Estuary, most studies in the report pertained to the 40-mile reach of the upper estuary extending from Key Bridge to Sandy Point. (SIMS-ISWS)

Citation 79

CLARK, LEO J. , DANIEL K. DONNELLY, ORTERIO VILLA JR

US Environmental Protection Agency, Annapolis, MD, Annapolis Field Office

Summary and Conclusions from the Forthcoming Technical Report 56. Nutrient Enrichment and Control Requirements in the Upper Chesapeake Bay

U S EPA

1973 (Aug), EPA-903/9-73-002-a, 94p.

English

The upper portions of the Chesapeake Bay and its tidal tributaries are currently suffering from an insidious eutrophication problem as evidenced by the increased frequency and persistence of undesirable algal blooms and the dramatic changes in the Bay's natural flora which have recently been experienced. Water quality monitoring data collected between 1968 and 1971 have shown an upward trend in phosphorus levels and indicated that inorganic nitrogen may presently be the growth rate-limiting nutrient since it is almost nonexistent during peak bloom conditions. In order to limit the maximum algal standing crop to 40 ug/l chlorophyll a, it was determined that total phosphorus and inorganic nitrogen concentrations should not exceed 0.12 mg/l and 0.8 mg/l, respectively. The achievement of these concentrations necessitates the institution of a considerable abatement program in the Susquehanna River Basin and the Baltimore metro area. (Modified author abstract)

Citation 80

CLARK, LEO J. , NORBERT A. JAWORSKI

US Environmental Protection Agency, Annapolis, MD, Annapolis Field Office

Nutrient Transport and Dissolved Oxygen Budget Studies in the Potomac Estuary

U S EPA

1972 (Oct), Technical Rep. No. TR-37,50p.

English

The purpose of this report is to model a portion of the nitrogen cycle, phosphorus deposition, and the occurrence of algal blooms as measured by chlorophyll a; as well as the effects of carbonaceous, nitrogenous, and benthic oxygen demand; algal photosynthesis, respiration and decay; and reaeration on the dissolved oxygen resources in the upper Potomac Estuary.

Citation 81

CLARK, LEO J. , STEPHEN E. ROESCH

US Environmental Protection Agency, Annapolis, MD, Annapolis Field Office

Assessment of 1977 Water Quality Conditions in the Upper Potomac Estuary

US EPA

1978(July), EPA/903/9-78/008,83p.

English

A multi-objective water quality monitoring program was conducted in the Potomac Estuary from July to September 1977. This program was comprised of slack water sampling, wastewater effluent sampling, and a series of special studies to further describe different facets of the dissolved oxygen budget including some algal related impacts. This report presents all of the data collected during the study along with an enumeration of the findings and conclusions that were based on a detailed analysis of this data.

Citation 82

COCHRANE, JOHN J. , CONSTANTINE J. GREGORY, GERALD L. ARONSON

Northeastern Univ. , Boston, MA

Water Resources Potential of an Urban Estuary. (Saugus River, Pines River and Lynn Harbor Complex)

1970 (June), NTIS PB-197 991,110p.

English

The water resources potential of the urban estuarine complex comprised of the Saugus and Pines Rivers and Lynn Harbor, Massachusetts, was evaluated. Impairment of recreational usage and nutrient reserves in sediments was studied. A laboratory study of the growth of marine algae, Ulva latissima, made in flowing sea water, indicates an optimum growth at nitrogen-phosphorous ratios of between 40 and 60 to 1, at a phosphate concentration of 120 micrograms per liter. Average values for nutrients in eutrophic areas were 268 micrograms/liter total orthophosphate and 0.513 mg/l nitrates. Sediments from these areas averaged 5.98% volatile solids, 0.532 mg/l extracted orthophosphates, and 2.177 mg/l total Kjeldahl nitrogen. In contrast, oligotrophic areas, including parts of the Pines River, had average values of 164 micrograms/l total orthophosphate, 0.175 mg/l nitrates, 0.79% volatile solids, 0.349 mg/l extracted orthophosphates and 0.294 mg/l total Kjeldahl nitrogen. (WRSIC abstract)

Citation 83

COLLETT, W. F.

Forth River Purification Board, Langgarth, Scotland

The Control of Estuarine Pollution

Chem Ind (Lond)

1967(Jan 7),25-29.

English

Scotland's views on comprehensive control of effluent discharges into estuaries are outlined. Control methods to achieve water quality suitable for various purposes are described and the following conclusions are drawn: full committal to the self-purification capacity of an estuary is impractical; estuaries should be divided into zones where discharges are subject to similar limitations, or more practically, on equality of effort rather than results; with wide margin of safety attached to pollution limitation, a complete knowledge of the self-purification capacity of an estuary is unnecessary before controls are applied; discharge of effluents must be controlled for the benefit of the estuary; control should be primarily for the current use of an estuary; remedial work should be phased according to availability of funds and expertise; priority must be given to those discharges which by their size, strength, or situation are the dominating factors in estuarine pollution; and if estuarine usage is to be maximal, the consideration is not how little need be done to improve effluents but how much can be required without excessive hardship to any segment of industry or the community.

Citation 84

COLLIAS, EUGENE E. , SVETLANA I. ANDREEVA

Univ. of Washington, Dept. of Oceanography, WA

Puget Sound Marine Environment an Annotated Bibliography

Univ. of Washington

1977,392p.

English

This is a bibliography with brief abstracts on all aspects, physical, chemical, and biological of the Puget Sound Marine Ecosystem.

Citation 85

COLLINS, N. R.

Gloucester, Eng.

Environmental Planning with Particular Reference to Water

Water Pollut Control

1978,77(2),211-218.

English

The British climate and settlement pattern mean that most of the country's water supply must be recycled. The natural water systems do not compare so favorably with those of Europe. Sections of the holiday coastline had totally untreated sewage discharges. The estuary and its adjacent groundwaters, being at the end of a topographical gradient, are paricularly vulnerable to pollution by the detritus of urban and agricultural activity. Land drainage is an integral and critical part of water management in the low and wet lands. Where large rivers form a boundary between local administrations or counties, the water authorities can become arbiters and link authorities. Treatment of domestic effluents and pollution of all kinds is reasonably well under control in the U. K. except in the coastal towns. The "polluter pays" principle will only be defensible it if is applied without discrimination and taken to mean that environmental conservation expenditure by industry is only another element in the operational cost arithmetic. The balance must be struck between cost and benefit to the public. Peak contaminations are no longer associated with urbanism and industry, but also agricultural use of pesticides, fertilizers, and field drainage systems. Critical areas of nascent eutrophication include Liverpool Bay, the Bristol Channel, the Solent, East Wight to Beachy Head, the Thames estuary, and the Wash and Humber estuaries. Political decisions which may be influenced by economic factors to the detriment of the environment can only be made after the due processes of planning law. Water Authorities are the controllers of development because no new settlement or land-use dispositions can be achieved without their full consent and active collaboration.

Citation 86

COOPER, DAVID C. , B. J. COPELAND

Dept. of Biological Sciences, State Univ. of New York at Binghampton, Binghampton, N Y

Responses of Continuous-Series Estuarine Microecosystems to Point -Source Input Variations

Ecol Monogr

1973,43,213-236.

English

Six continuous-series microecosystems, each containing five cells, were consructed to simulate hydrological factors of estuarine regions. Exchange and retention characteristics were adjusted to closely model the hydrological conditions of Trinity Bay, Texas. Primary production and community respiration in the first three cells of the microecosystems were dependent on both quantity and quality of freshwater input, whereas primary production and community respiration in the saltwater portions (cells 4,5) of the microecosystems were virtually independent of the quantity and quality of freshwater input. Metabolism of the freshwater portions of the microecosystems was heterotrophic under normal flow conditions and autotrophic under drought conditions. Addition of an industrial effluent to the freshwater inputs resulted in extensive shifts towards metabolic heterotrophy of the more freshwater portions of the microecosystems. Metabolisms of the saltwater cells was heterotrophic under all conditions of freshwater input. The upstream communities were adapted to a dependency on allochthonous materials input for production and respiration maintenance. Retarding freshwater input resulted in tying up larger portions of the nutrient pool within the systems in living components. Addition of industrial effluent increased the community maintenance requirements. Retarding freshwater input acted as an environmental stress on the first three cells of the microecosystems. Magnitudes of production and respiration were significantly lower, and zooplankton standing crops and species diversity decreased significantly. Addition of industrial effluent produced similar effects. Decreased freshwater input rate (primary stress) rendered the receiving communities more susceptible to the industrial effluent addition (secondary stress).

Citation 87

COPELAND, B. J.

North Carolina State Univ. , Raleigh, Dept. of Zoology

Nutrients and Eutrophication in the Pamlico River Estuary, NC - Preliminary Results, 1971-72

WRRI North Carolina

1972(Nov), Interim Rep. , 23p.

English

Studies were initiated in 1965 to study the effects of expected increases in phosphorus concentrations in the Pamlico River Estuary from phosphate mining operations onshore. A series of reports have followed, reporting phosphorus concentrations, hydrography, phytoplankton, benthic animal populations, zooplankton, the effects of phosphorus on algae, and a summary of phosphorus effects for the initial periods of work during 1965-69. During 1969-71, the sampling was expanded to include nitrogen concentrations in the estuary as well as nutrient concentrations in tributary streams. A preliminary analysis of data taken during 1971-72 for nutrients and response of the biological components is presented.

Citation 88

COPELAND, B. J. , DONALD E. WOHLSCHLAG

Univ. of Texas, Marine Science Inst. , Port Aransas, TX

Biological responses to nutrients -- eutrophication: Saline water considerations. Advances in Water Quality Improvement.

Water Resources Symposium No. I. Papers. Gloyna, Earnest F. and Eckenfelder, W. Wesley, (Held in Austin, Tex. , April 1966.) Sponsored by Univ. of Texas, Center for Research in Resources, Austin

Univ. of Texas Press, Austin

1968,65,82.

English

1) The addition of a known nutrient source to a marine community resulted in alteration of the metabolic patterns of the ecosystem. An increase in the amount of nutrient material caused an increase in photosynthetic production. 2) Species diversity of zooplankton is reduced in marine environments receiving various types of organic wastes, which an interruption of normal community structure by the addition of new nutrient materials. 3) A theoretical case was presentd to demonstrate that slight toxic effects are pronounced although not detectable by conventional methods of measurements. With just a slight increase in mortality rate the biomass of the fishes affected would be decreased greatly. 4) Experiments on the metabolic rate of fishes revealed that slight pollution stresses tend to lower the metabolic rates considerably. The depression was greatest when the fish were already subject to regular environmental stress, such as low temperature. 5) Most of the effects of waste materials in the marine environment are subtle. It appears that the community approach rather than the organismic approach will be more fruitful in evaluating the impact of man-made changes in inland saline water ecosystems, notwithstanding the fact that the effect of stresses on individual populations can be physiologically quantifiable.

Citation 89

COPELAND, B. J. , H. LEE DAVIS

Dept. of Zoology, North Carolina State Univ. , Raleigh, NC

Estuarine Ecosystems and High Temperatures

WRRI UNC

1972(June), UNC-WRRI-72-68 or UNC Contribution No. 29,90p.

English

A study was designed to investigate the responses of estuarine community structure respiration and production to added heat, sewage and their combination. The study was conducted in plastic pools containing transplanted ecosystems from South Creek Estuary, NC. Temperature replication was achieved. Temperature in the heated pools was regulated at 5 C (9 F) above that of the ambient pools; but due to local and short-term weather variations, the actual differences were 2-5 C, 3-5 C and 0-12 C during spring, summer and winter, respectively. Thermal treatment increased the nutrient regeneration rates, yielding slightly higher algal biomass; although, seasonal differences were more significant. Gross community productivity was regulated by ammonia, light, and temperature levels and total respiration was regulated by temperature and primary productivity. Sewage addition substantially increased the ammonia levels, particularly during the winter. Community metabolism responded positively to thermal treatment, but not to sewage treatment. Thermal treatment and the combination of sewage and thermal treatments increased the photosynthesis/respiration ratios (P/R) during spring and summer, but decreased the P/R when temperature was limiting during winter. Temperature had very little effect on phytoplankton composition during the spring. Blue-green algae and coccoid green algae dominated in the heated and sewage-treated pools during summer. Nekton and benthic (blue crabs, grass shrimp, widgeon grass, bay clams, and fish) increased to higher biomass in the heated pools during spring and achieved a lower biomass in the heated pools during summer than in the ambient pools. Sewage addition did not substantially alter the patterns between heated and ambient systems. Oysters, bay clams and widgeon grass reached higher biomass in the heated pools during winter than in the ambient pools.

Citation 90

COPELAND, B. J. , JOHN E. HOBBIE

North Carolina State Univ. , Dept. of Zoology, Raleigh, NC

Phosphorus and Eutrophication in the Pamlico River Estuary, NC

North Carolina Water Resourc. Res. Inst. , Raleigh, N C

1972 (Mar), UNC-WRRI-72-65,95p.

English

The effects of phosphorus on the ecology of the Pamlico River Estuary, N. C. were measured. Surveys were conducted to determine hydrography, phosphorus concentrations in the water and sediment, and phytoplankton speciation and biomass in relation to inputs from the Tar River Basin and phosphorus mining activities. Studies were designed to determine phytoplankton response to phosphorus additions, phosphorus exchange with sediment, phosphorus utilization by Rangia clams, and phosphorus uptake by phytoplankton. The Pamlico River Estuary is typically oligo- to mesohaline; tidal influence is minimal and the estuary occasionally stratifies. Stratification is easily destroyed by winds. During summer stratification, anaerobic conditions develop near the bottom muds. The estuary already is rich in phosphorus, and concentrations are increasing via land runoff and mining wastes. (Author)

Citation 91

CORRELL, D. L.

Chesapeake Bay Center for Environmental Studies, Box 28, Edgewater, MD 21037

Estuarine Productivity

BioScience

1978,28,646-450.

English

An article which reviews estuarine particle production, consumption and mechanisms for maintaining high productivity at a level understandable to the sophisticated layman. Orientation is largely toward Chesapeake Bay as a result of the work cited. It concludes that 80-90% of the primary production is in situ by phytoplankton (small forms of less than 20 um) rather than imported and that the required nitrogen and phosphorus is effectively recycled through various routes such as the sediments, aquatic plants, etc. Article acknowledges the importance of hydrography through indicating that the estuarine countercurrent flow traps nutrients and offers migratory paths to organisms, i. e. passive flow toward the ocean in surface and toward land in bottom waters. Article suffers from lack of critical evaluation of the cited literature and lack of careful editing. 41 references. Abstr. by KLW.

Citation 92

CORRELL, D. L. , M. A. FAUST, J. W. PIERCE, J. STEVENSON, K. LOMAX

Chesapeake Bay Center for Environmental Studies, Box 28, Edgewater, Md 21037

A Quantitative Study of the Diffuse Source Loadings of Chesapeake Bay, (Progress Report)

Chesapeake Bay Research Consortium, Inc.

1976(Nov), Rep. No. NSF/RA-761357,13p.

English

Research conducted by the Chesapeake Research Consortium during the period from December 1,1975 to November 30,1976 is reported. The research of organic and mineral particulates, and of indicators of bacterial pathogens on a seasonal basis, per unit of watershed area of a series of land use types prevalent in the Chesapeake Bay region; (2) test whether expedited land use mapping and area yield loading rates measured at intensive study locations can be used to calculate diffuse source loading of Chesapeake Bay from other control areas of its watershed; and (3) develop a tested methodology, of regional scope, for the prediction of land use effects via diffuse source pollution upon water quality in Chesapeake Bay. Described are the construction and instrumentation of the monitoring stations; Rhode River Watersheds, Choptank River Watersheds, and Patuxent River Watersheds. A status report on other program activities is included.

Citation 93

CORY, R. L.

Geological Survey, Edgewater, MD

Changes in Oxygen and Primary Production of the Patuxent Estuary, Maryland, 1963 Through 1969

Chesapeake Sci

1974(June),15(2),78-83.

English

Water quality was monitored from 1963 through 1969 in the upper-middle Patuxent estuary, near Benedict, Maryland. Over the period of record, a pronounced change occurred in the diel oxygen measurement, particularly during the months of July, August, and September. Annual variations of dissolved oxygen ranged from 3.6 to 15.0 mg per liter in 1964 and from 2.3 to 16.5 mg per liter in 1969 with percentage saturation varying from 60% to 130% in 1964 and from 30% to 84% in 1969. The magnitude of diel summer oxygen variation changed from about 3 to 7 mg per liter per day over the same period. From hourly values of temperature, oxygen, and conductivity, gross primary production (GP) and respiration (R) were estimated. From the seasonal data, GP ranged from about 3 to 25 g of oxygen per sqm per day, and R ranged from about 4 to 32 g of oxygen per sqm per day. On average days, GP ranged from 2 to 10 g of oxygen per sqm per day in 1964 and from 1 to 16 in 1969. In 1964, daily average GP was 5.2 grams of oxygen per sqm per day as compared to 6.1 in 1969, and respiration was 6.1 grams of oxygen per sqm per day in 1964 versus 10.2 grams of oxygen per sqm per day in 1969, increases of 20% and 16%, respectively. Ratios of GP/R averaged 0.84 in 1964 versus 0.60 in 1969, reflecting a larger respiration in 1969 and suggesting a trend towards community instability. The increases in production were attributed to upstream domestic waste loading. If the present trend increases, metabolic imbalance and anaerobic conditions may develop.

Citation 94

COX, D. C. , P. R. FAN, K. E. CHAVE, R. I. CLUTTER, K. R. GUNDERSEN

Hawaii Univ. , Honolulu, Water Resources Research Center

Estuarine Pollution in the State of Hawaii, Volume 2: Kaneohe Bay Study

WRRC Hawaii

1973(Nov), Technical Rep. No. 31,444p.

English

Kaneohe Bay, a combination coastal-plain estuary and lagoon, is used extensively for recreation and as a fishery. Fresh water discharges to the bay, principally from perennial streams, originally totaled about 97 mgd, but have been reduced by diversions by about 38 percent. Only 8 percent of the exchange transport with ocean water affects the southeastern part of the bay, which comprises 27 percent of the bay volume. Into this southeastern part of the bay is discharged nearly 3 mgd of sewage effluents, mostly after secondary treatment. During floods, both perennial and intermittent streams discharge large amounts of sediments, one stream discharging an estimated 9470 tons in a single 24-hour storm period. High concentrations of total coliforms and fecal coliforms occurred in the stream mouths and in the vicinity of sewer outfalls; however, most of the bay water met the state standards for the highest water quality class. Nitrogen concentrations offshore, in streams, and the bay were found generally to exceed standards, indicating unreasonably restrictive standards. Phosphorus concentrations in streams and at outfalls exceeded standards but decreased rapidly away from points of discharge. Plankton studies indicated a high productivity in the south decreasing to lower productivity to the north. Trends toward eutrophication, decreasing diversity, and stability have been documented. Among alternatives for reducing the pollution of the bay by sewage effluents, the diversion of the effluents by force main to the open ocean east of Kaneohe Bay was found to be the most economical.

Citation 95

CRAIG, N. J. , J. W. DAY, JR.

Louisiana State Univ. , Baton Rouge, Center for Wetlands Resources

Barataria Basin: Eutrophication Case History

Louisiana State Univ. , Center for Wetlands Resources

1976(June),27p.

English

The cumulative impact of eutrophication and salinity changes on the nursery grounds of the Barataria Basin were assessed. Much of man's activity in the coastal zone leads to salinity change or the introduction of excessive nutrients into water bodies. Various factors producing these impacts are identified and the relative importance of each of these factors is quantified. Predictions about future impacts are based on the continuation of present trends and mitigation possibilities. The Barataria Basin is an interdistributary bay-wetland system bordered by Bayou Lafourche, the Mississippi River, and the Gulf of Mexico. The coastal wetland of Barataria Basin, extending from the fresh swamp of the upper basin to the saline marsh bordering the coast, serves as water storage reservoirs, nursery areas, chemical transformation factories, and sources of organic matter and nutrients. The importance of the estuaries as nursery grounds cannot be overstressed. Barataria Basin alone is responsible for about 45% of Louisiana's total commercial fishery harvest.

Citation 96

CRAIG, N. J. , J. W. DAY, JR.

Louisiana State Univ. , Baton Rouge, Center for Wetlands Resources

Cumulative Impact Studies in the Louisiana Coastal Zone; Eutrophication; Land Loss

Louisiana State Univ. , Center for Wetlands Resources

1977(June),166p.

English

This publication consists of two parts. Part 1 recognizes that eutrophication is a widespread problem throughout the coastal zone of Louisiana. It leads to poor water quality, development of nuisance algal blooms, decline in desirable commercial and sports fishery species, and diminished recreational usefulness of water bodies. The major cultural sources of nutrients leading to eutrophication are urban runoff, domestic sewage, and agricultural runoff. The causes and consequences of wetland losses in coastal Louisiana are examined in the second part. Man-induced land losses result from flood control practices, impoundments, and dredging of canals and channels with their subsequent widening. Wetland loss also results from the placement of spoil upon the marsh and impounded areas which are drained for land reclamation.

Citation 97

CRIM, R. I. , N. L. LOVELACE

US Environmental Protection Agency, Annapolis, MD, Annapolis Field Office

Auto-Qual Modelling System

US EPA

1973(Mar), Technical Rep. 54,301p.

English

Two mathematical models were designed to meet needs of Federal, State or local agencies for water quality planning. The models are designed specifically for water bodies in which widths are small relative to their length. Most freshwater streams and tidal tributaries to estuarine bays fit that description. These are waters whose net hydraulic circulation patterns are essentially undirectional.

Citation 98

CROUZET, P. , C. BEAUPOIL

Study of the Restoration of the Laita River, Methodology Approach to the Restoration of a Polluted Estuary

Rev Int Oceanogr Med

1978,50,37-42.

French

Laita river is the estuary of a drainage basin that used to be rich in Salmons. It is now heavily polluted, due mainly to flows from a paper pulp plant located upstream. The study was undertaken by ABLB. Its purpose was the coming back of Salmons in the estuary, in technical and economic conditions that could be accepted without polluting sea-inshore environment. The research made necessary to study particularly the following topics: (1) Courantology of the estuary (working up of a mathematical model), (2) Determination of toxical and salubrious levels in pollutants (ecological survey), (3) Courantology and sedimentology of sea-inshore environment. The investigation led to practical proposals for cleaning up the estuary; it is getting carried out at the end of 1977.

Citation 99

CUSTER, STEPHEN W. , RICHARD G. KRUTCHKOFF

Virginia Polytechnic Inst. , Blacksburg, VA

Stochastic Model for BOD and DO in Estuaries

J San Eng Div Am Soc Civ Eng

1969(Oct),95(SA5),865-886.

English

The BOD and DO of estuaries was studied by using a statistical model of the biodegradation of pollutants. Using the assumption that the degrading process in nature is descrete rather than continuous, a stochastic model is constructed for the process.

Unlike the results previously obtained for streams the mean effects did not coincide with previously obtained deterministic results. The mean effect and the fluctuations about this effect were compared with data from the Potomac estuary. The comparison is remarkably good, and strongly indicates the validity of the stochastic model.

Citation 100

DAHL-MADSEN, K. I.

Water Quality Inst. , Horsholm, Denmark

Mathematical Modeling of Eutrophied Coastal Areas

Prog Water Technol

1978,10(5-6),217-235.

English

Combined hydrodynamic, transport-dispersion and eutrophication models have been developed and applied in the Danish wastewater planning process for marine coastal water systems. The water quality of these water systems has been described by 5-14 state variables and biochemical processes. The phytoplankton growth equation used in the later versions of the eutrophication models relates growth to intracellular concentrations of P and N. A comprehensive evaluation of field and model data shows that the agreement between observed and simulated values of variables has to be improved by further model development.

Citation 101

DAIBER, FRANKLIN C.

Delaware Univ. , Newark, College of Marine Studies

Flushing Pattern of Certain Tidal Streams in Delaware

Delaware Univ.

1972 (Jan), Completion Rep. July 66-June 70,48p.

English

The flushing characteristics of two tidal streams, the Broadkill and Murderkill Rivers, have been established. Water quality characteristics of biological importance are described for the Broadkill River: there is a longitudinal and seasonal distribution of the various forms of phosphorus and nitrogen, oxygen, pH and chlorophyll pigments. The distribution of these various parameters is determined by the hydrographic features of the stream, the season and the location of one existing sewer outfall. (Author)

Citation 102

DAVIS, E. M. , W. W. ECKENFELDER

Texas Univ. , Austin

Estuarine Measurements for Productivity and Evaluation of System Waste Discharge Effects

In: Fifth International Water Pollution Conference, San Francisco, July 26-Aug 1,1970

1970,9p.

English

The overall productivity of two estuarine systems on the Texas coast, namely Taylor Bayou and Chocolate Bayou, was evaluated and the seasonal effects of chemical waste discharges on the ecology of the systems was estimated. The variation of productivity by season of the year over a two-year period was established by field analysis which included the measurement of gross photosynthesis and respiration and the species diversity index in each system. These results were compared to laboratory data using waste samples taken from each estuary. It was established that the community productivity and the effects of additions of chemical process wastes could be determined under laboratory conditions. Chlorophyll-a response varies with the population quite extensively and can increase due to phytoplankton increases. The nutritive benefit is therefore quite rapid for some wastes. Even with increases of chlorophyll-a concentrations some photosynthetic supression may occur due to a concurrent toxic effect by the waste. Diversity indexes decreased most often due to the toxic effect of the wastes on the zooplankton. The dinoflagellates are more seriously effected, followed by the green algae, diatoms then bluegreens. Application of the principles involved herein are by no means limited to the estuaries of Texas coast, and may be applied to any aquatic ecosystem regardless of the hemisphere in which it is located.

Citation 103

DAVIS, G. J.

East Carolina Univ. , Greenville, NC 27834

Seasonal Changes of Rooted Water Plants of the Pamlico River Estuary

WRRI North Carolina

1975, Annual Rep. , 51p.

English

Citation 104

DAVIS, G. J. , M. M. BRINSON, W. A. BURKE

East Carolina Univ. , Greenville, NC 27834, Dept. of Biology

Organic Carbon and Deoxygenation in the Pamlico River Estuary

WRRI North Carolina (Raleigh)

1978(Jan), UNC-WRRI-78-131,123p.

English

The distribution, sources and sinks of organic carbon were studied in the Pamlico River Estuary during 1975-1977. The main source of organic carbon was from phytoplankton productivity, which, together with other sources from within the estuary, provided 64% of the organic carbon inputs. The remaining 36% was mainly from tributaries. Organic carbon losses (sinks) were 80% as water column respiration and 20% as outflow. Sedimentation and benthic respiration are undetermined losses. Total organic carbon (TOC) varied seasonally with the highest levels occurring during the summer months when flow rates were low. Also, TOC normally displayed a gradient with the highest levels consistently in the upper reaches near Washington, DC. Approximately 79% of the TOC in the estuary consisted of dissolved organic carbon (DOC) which accounted for most of the seasonal variations in TOC. Levels of particulate organic carbon (POC) were fairly constant throughout the year with the exception of sporadic increases in phytoplankton biomass. The largest input of organic carbon to the estuary is from productivity of phytoplankton which is more readily available to organisms utilizing oxygen than the more abundant and less refractory inputs from tributaries. Because of this, the regulation of inorganic nutrient sources (mainly nitrogen) is more important for controlling increases in organic loading than are tributary inputs of organic carbon.

Citation 105

DAY, JOHN W. , JR. , CHARLES M. WEISS, H. T. ODUM

Institute for Environmental Health Studies, Morehead City, NC

Carbon Budget and Total Productivity of an Estuarine Oxidation Pond Receiving Secondary Sewage Effluent

2nd International Symposium for Waste Treatment Lagoons, 23-25(June)1970, Kansas City, Missouri

1970,100-113.

English

A waste stabilization lagoon was modeled on a digital computer in PL/1 computer language. Included in the program are constants for inflow, light intensity, rate of respiration, rate of photosynthesis, and other parameters. All of these constants were determined from experimental studies of existing waste stabilization lagoons. These studies were performed in their entirety for over a year. The data was then analyzed and arranged to arrive at the desired constants. Development of a model which was deemed a satisfactory representation of the pond system allowed work to be done on the effect which various outside stimuli will have on system performance, with the desired end result being the prediction of changes which will be undergone by aquatic environments receiving a certain waste flow. The model may also be used to determine avenues of further investigation in assessing the effects of treated sewage on estuarine systems.

Citation 106

DEAN, DAVID, MICHAEL A. MAYURKIEWICZ

Maine Univ, Walpole, Ira C. Darling Center for Research, Teaching and Service

Water Quality - Benthic Invertebrate Relationships in Estuaries

Maine Univ.

1970(June), Completion Rep. , 31p.

English

This is a study of the relationships between water quality and estuaries, representing heavily polluted, moderately polluted and relatively unpolluted conditions, respectively. Preliminary hydrographic, sedimentary and faunal surveys were conducted to determine comparable areas in each estuary to be analyzed for interaction between level of pollution and invertebrate benthic fauna present. Field studies conducted in each area included an analysis of the qualitative and quantitative distribution of benthic invertebrates, the seasonal composition of the meroplankton, the settlement of larvae and the hydrography of the area. Laboratory studies included: (1) the determination of particle size distribution of sediments and the amount of volatile solids present; (2) the facility with which different indigenous species of benthic invertebrates can be cultured in the laboratory; (3) the temperature, dissolved oxygen and salinity tolerances of larvae and adults; (4) experiments on temperature as a factor influencing the spawning of adults; (5) the influence of different substrates upon larval settlement; (6) the effect of water quality upon survival, reproduction, development and growth of benthic invertebrates.

Citation 107

DECOURSEY, P. J. , W. B. VERNBERG

South Carolina Univ. , Columbia, Belle W. Baruch Coastal Research Inst.

The Effect of Dredging in a Polluted Estuary on the Physiology of Larval Zooplankton

Water Res

1975(Feb),9(2),149-154.

English

The effect of water samples from three dredging locations in Charleston Harbor and its tributaries upon the physiology of larval or juvenile zooplankton was determined. The samples for each dredging location included dredge site, 200 yd downstream, and the weir of the diked disposal area. The effect of the water samples upon survival, metabolism, and behavior of larval or juvenile zooplankton was measured. Since salinities varied at the three locations, the assay organisms included juvenile Daphnia for Location I, newly hatched Palcomonetes for Location II, and larval Polydora for Location III. Weir water proved most toxic; the sample from 200 yd downstream was intermediate in effect. Least toxicity was observed in water from the dredge site.

Citation 108

DELTREIL, JEAN-PIERRE, MICHELLE FEUILLET, GUY ARCHAMBEAU

Etude Experimentale de la Fertilisation Phosphatee dans les Claires a Huitres

Rev Trav Inst Peches Marit

1977,41(3),283-297.

French

Citation 109

DENN, M. M. , R. K. JAIN

Delaware Univ. , Newark, Dept. of Chemical Engineering

Control of BOD Upsets in the Delaware Estuary

Delaware Univ.

1974(Nov), Completion Rep. OWRR A-024-DEL(1),87p.

English

Short term regulation of effluent BOD levels is studied as a means of maintaining water quality in an estuary following a surge in biochemical oxygen demand. Optimal control theory is used to solve the problem, with the constraint that deviations in effluent BOD from regulated means must average to zero. Optimal solutions are obtained for both a lumped and distributed parameter estuary model, using parameters characteristic of the Delaware estuary. Improvements in water quality using the optimal effluent regulation policy are inadequate to justify implementation.

Citation 110

DENOYELLES, F. , W. J. O'BRIEN

Phytoplankton Succession in Nutrient Enrichment Experimental Ponds as Related to Changing Carbon, Nitrogen and Phosphorus Conditions

Archiv fur Hydrobiol

1978,84(2),137-165.

English

A study of phytoplankton succession was made to determine the relation between changing conditions and phytoplankton distribution during eutrophication. The influence of carbon, nitrogen and phosphorus availability on the phytoplankton community and changes of species was observed under three levels of nitrogen, phosphorus and potassium enrichment in 8 experimental ponds. Data are presented showing that phytoplankton changes in terms of overall biomass were not only directly associated with nitrogen and phosphorus enrichment and in some cases also with zooplankton grazing, but also to changes in inorganic carbon availability; further, that such major changes in species composition are influential in establishing the undesirable conditions associated with eutrophication.

Citation 111

DEPARTMENT OF THE ENVIRONMENT

London

Biological Indicators of Estuarine Pollution-Research and Application. Report of a Seminar, London, June 1976

Dept. of the Environment and Transport

1978, Research Rep. No. 22,79p.

English

The seminar on biological indicators of estuarine pollution was organized to promote consultation between the Department of the Environment, as sponsors of the research, and the performing organizations, including the Natural Environment Research Council and other institutions. Research currently being pursued by the Natural Environment Research Council, under contract to the Department of the Environment, its scope for practical application, and future research needs were considered. The papers and the ensuing discussions are summarized in this report.

Citation 112

DITSWORTH, GEORGE R.

Federal Water Pollution Control Administration, Northwest Region, Pacific Northwest Water Laboratory, Corvallis, OR

Environmental Factors in Coastal and Estuarine Waters: Bibliographic Series - Volume II. Coast of Washington

Fed Water Pollut Control Admin

1968(Aug).

English

Indexed herein are references to literature pertaining to the marine waters of the State of Washington. References to these papers, most of which have been published since 1955, are indexed under one or more of the following headings: Marine Biology, Fisheries, Geology, Chemical and Physical Oceanography, Water Pollution, and Bibliographies, Literature Surveys, and Compilations.

Citation 113

DUEDALL, I. W. , H. B. O'CONNORS , J. H. PARKER , R. E. WILSON ; A. S. ROBBINS

Marine Sciences Research Center, State University of New York, Stony Brook, N Y 11794

The Abundances, Distribution and Flux of Nutrients and Chlorophyll a in the New York Bight Apex

Estuarine Coastal Mar Sci

1977,5,81-105.

English

Tidal, spatial and seasonal changes in salinity, temperature and the concentrations of ammonium, nitrite, nitrate, phosphate, silicic acid, chlorophyll a and suspended matter in the waters between Sandy Hook, New Jersey, and Rockaway Point, New York, were measured during five cruises which took place between November 1973 and June 1974. Over this period concentrations of nutrients and chlorophyll a were much greater than those found in the adjacent coastal waters. The main source of the ammonium, nitrite and phosphate is sewage effluent which is discharged into the waters surrounding the New York metropolitan region; nitrate comes mainly from the Hudson River and silicic acid is discharged in large amounts from river and sewage sources. The largest tidal variation in salinity and nutrient and chlorophyll a concentrations occurs near Sandy Hook where the Hudson River discharge has the greatest influence. Near Rockaway Point, nutrient and chlorophyll a concentrations are generally lower and salinities higher than those observed near Sandy Hook because of the inflow of Bight water by non - tidal currents. During the spring freshet nutrient concentrations, especially ammonium, are low along the transect due to (1) dilution by the spring freshet and (2) utilization by the abundant phytoplankton. Flux calculations for the June observations indicate that most of the nutrients and chlorophyll a are being transported from the lower Hudson Estuary into the New York Bight apex.

Citation 114

DUKE, THOMAS W. , ANATOLITY I. SIMONOV

Environmental Research Lab, Gulf Breeze, FL

American-Soviet Symposium on the Biological Effects of Pollution on Marine Organisms (1st)

US Environmental Protection Agency

1978, EPA/600/09-78/007,176p.

English

This symposium was conducted under US-USSR Environmental agreement, Project 02.06-21 titled 'Influence of Pollutants on Marine Organisms'. American and Soviet specialists discuss state-of-the-art for hydrobiological analysis of basic structural components of marine ecosystems and the influence of various pollutants on these components. Participants define problems related to methods for modeling the influence of pollutants on the marine environment, long-term forecasting and determination of permissible loads of pollutants, and the unification and intercalibration of methods for determining production of micro-organisms of ocean bacterioplankton and phytoplankton. Results or laboratory research on the influence of pollution on the marine environment are presented.

Citation 115

DUNSTAN, WILLIAM M.

Woods Hole Oceanographic Institution, Woods Hole, MA

Problems of Measuring and Predicting Influence of Effluents on Marine Phytoplankton

Environ Sci Technol

1975,9,635-638.

English

Concentrations of nitrogen (N) and phosphorus (P) in sewage effluents are high enough to increase the levels of these nutrients in coastal waters and thereby to influence phytoplankton ecology. A variety of algae cultured in several samples from one treatment plant failed to grow to the levels that would be predicted based on the N and P concentrations. Effluents from other treatment plants were even less predictable. Furthermore, different groups of algae and species within these groups varied in their response to different effluents which were matched in N and P concentrations. Effluent from one plant which produced deficient growth, based on the N and P concentrations, grew to expected levels when trace metals were added to the effluent. While N and P added to the coastal environment from sewage effluent stimulates general phytoplankton growth, the addition of effluents emphasizes the role of minor growth substances which might otherwise not have been important in the N-limited coastal region. These factors then become important in causing changes in the pattern of phytoplankton production, distribution, and population dynamics.

Citation 116

DUNSTAN, WILLIAM M. , DAVID W. MENZEL

Woods Hole Oceanographic Institution, Woods Hole, MA 02543

Continuous Cultures of Natural Populations of Phytoplankton in Dilute, Treated Sewage Effluent

Limnol Oceanogr

1971(July),16(4),623-632.

English

Seawater diluted with secondary-treated sewage effluent provides excellent enrichment for the maintenance of mixed natural populations of marine phytoplankton in continuous culture. Treated effluent, sampled over 1 year, was consistent in the ratios of plant nutrients' and similar in its properties of plant growth stimulation and level of toxicity. The heterogeneous continuous culture system produced large quantities of plant carbon with the concomitant removal of nitrogen and phosphorus from sewage effluent. The plant species that grew in the continuous cultures were common to the typical coastal phytoplankton and the selection and elimination of species was gradual considering the chemical complexity of the sewage effluent enrichment.

Citation 117

DUXBURY, ALYN C.

Dept. of Oceanography, U. of Washington, Seattle 98195

Orthophosphate and Dissolved Oxygen in Puget Sound

Limnol Oceanogr

1975,20(2),270-274.

English

The concentrations of dissolved oxygen and inorganic orthophosphate at a single location in the main basin of Puget Sound over the period 1934-1973 show no long term change that can be related to man's increasing discharge of wastes. A change in concentration in annual mean values of dissolved oxygen and inorganic orthophosphate can however be related to variations in the freshwater content and the influx of seawater into the sound.

Citation 118

EDWARDS, ARTHUR P.

Cold Regions Research and Engineering Lab Hanover, NH

A Guide to the Use of 14N in Environmental Research

Cold Regions Res Eng Lab, NH

1978(Sept), CRREL-SR-78-8,77p.

English

The fate of the mineral nitrogen in wastewater can be established only through natural or artifical stable isotopic labeling. This report assesses the possibilities and problems associated with such tracer techniques applied to the small amounts of nitrogen normally present after secondary waste treatment. The methods outlined for sample processing to minimize analytical errors are applicable to other types of environmental research involving isotope ratio analysis as a means of tracing nitrogen in the biosphere.

Citation 119

EDWARDS, P.

Durham Univ. (England), Dept. of Botany

Benthic Algae in Polluted Estuaries

Mar Pollut Bull

1972(Apr),3(4),55-60.

English

On site studies were made of three estuaries in northeastern England in which different conditions of pollution exist. The rivers, located in County Durham, are the Wear, a relatively unpolluted stream, the Tyne, which receives a large volume of untreated sewage, and the Tees, which receives industrial wastes. These systems provide a huge natural experiment since the degree or type of pollution is probably the only environmental factor that varies significantly between the three estuaries. The algal flora of the estuaries is compared to reveal the effects of different kinds of contamination. A total of 69 stations at about 1 km intervals intervals reaching from the mouth to the tidal limit of each estuary were used to determine the various species of algae. Vegetation identified consists of 54 species from the three estuaries; these are listed. A table also gives the species of benthic marine algae in the Tees estuary for 1935. A decrease in algal vegetation since the 1930's in the Tees is probably due to growth of the chemical industry and the associated discharge of toxic chemical wastes.

Citation 120

EDWARDS, P.

Durham Univ. (England), Dept. of Botany

An Assessment of Possible Pollution Effects over a Century of the Benthic Marine Algae of CO, Durham, England

Bot J Linn Soc

1975,70(4),269-305.

English

One of the most polluted British shores is in County Durham, England. Pollution effects could be studied there, because extensive herbarium algal collections were made from 1793-1864 before pollution increased dramatically. This list was revised according to modern algal systematics and surviving herbarium specimens examined. There were 145 species, although 8 were excluded because they may not have been collected in Durham and 3 because they were incorrectly identified. These were compared with the present flora of 122 species collected. A detailed list of species is presented, showing their vertical and seasonal abundance, reproduction, characteristics and collection date. Eighty-six species were common to both lists. Approximately 48 species were common in the earlier study and 53 now (excluding estuarine algae). The figures indicate there has been little or no reduction in common species with time and pollution. Of the 48 species found earlier, six are now absent and two rare; therefore there has only been a 16.6% reduction in common species over the past century despite increases in industrialization and urbanization. It is concluded that pollution has had only a minimal effect on species diversity on the open Durham County coast where there is good water circulation.

Citation 121

EHRHADT, MANFRED, JU HEINEMANN

Rgen. Meereskunde Inst, W Germany

Hydrocarbons in Blue Mussels from the Kiel Bight

Environ Pollut

1975(Dec),9(4),263-283.

English

Although the Kiel Bight, W. Germany, receives relatively little direct fossil fuel pollution, the neighboring Baltic Sea is heavily polluted by excessive eutrophication. Blue mussels are used as an indicator species to measure amounts of petroleum hydrocarbons present in the Kiel Bight. Data indicate that mussels ingest hydrocarbons from the surrounding water, which, depending on the season, has varying concentrations of fossil and biogenic hydrocarbons. The mussels degrade the paraffinic fossil and biogenic hydrocarbons. The degradation of cyclic saturated and aromatic hydrocarbons, which originate from fossil fuels, is much less efficient. (18 references, 4 tables)

Citation 122

EHRHARDT, J. P.

Serv. Mixte de Controle Biol. , BP 16,91310 Montlhery, France

Techniques for Studying Biological Modifications Caused by Coastal Restructurations

Rev Int Oceanogr Med

1978,50,11-19.

French

In case of eutrophication favoured by the reduced circulation of sea waters sheltered with dikes or alveolar complexes and by the sewage dumps which are rich in mineral and organic elements, the biological survey consists of planktonological and bacteriological studies. The first studies aim at detecting a red tide beginning with the planktonic population survey, and the flagellate planktonic species identification and with the search of their toxicity. The bacteria studies involved not only the aerobic bacterial colony and coliform colony counting but chiefly the control of the anaerobic bacterial microflora presence and the testing of the sulphate reducing activity of the samples. The biochemical studies consist of the assay of mineral and organic elements. They have only a provisional value and have to be completed by a careful and periodical survey of physical and chemical parameters relative to the changed area.

Citation 123

EISERMANN, JOHN L. , J. DOUGLAS SMITH

Selective Nutrient Removal from Secondary Effluent

Office of Research and Development, US Environmental Protection Agency, Washington, D. C. 20460

1973(Sept), EPA-670/2-73-076,155p.

English

Exchange diffusion (Donnan dialysis) with ion-exchange membranes was investigated as a potential process for the removal of nitrate, phosphate and ammonia from secondary sewage plant effluents. Using commercial ion-exchange membranes & plate-and - frames configuration ninety percent removals were obtained in laboratory and pilot scale experiments. Ammonium removal appears to be economically feasible while a combined nitrate - phosphate system is only marginally economic at the present state of development. Improvements in cell configuration and membranes are suggested as a means of improving the process costs.

Citation 124

EL-SABH, MOHAMMED, I. , E. BOURGET, M. J. BEWERS, J. C. DIONNE

Departement d'Oceanographie, Universite du Quebec a Rimouski

Oceanography of the St. Lawrence Estuary

Naturaliste canadien (publication of Symposium on the Oceanography of the St. Lawrence Estuary, Universite du Quebec a Rimouski, April 12-14,1978)

1979(Jan/Feb),18 papers and a bibliography.

English

Contributions on estuarine dynamics, mixing, surface and internal tides, trace metals, suspended particulate matter, primary production, fisheries and pollution.

Citation 125

ELEUETERIUS, C. K.

Gulf Coast Research Lab, Ocean Springs, MS

Mississippi Sound Temporal and Spatial Distribution of Nutrients

Mississippi-Alabama Sea Grant Consortium

1976, MA SGP-76-024,66p.

English

Mississippi Sound, an estuarine system, is the eventual recipient of the accumulative effluents from activities throughout the drainage basin and is further altered by other direct actions such as dredging and construction. In order to assess the effect of present and future development on the water quality of the Sound, it is necessary to ascertain the existing regime of nutrients through determination of descriptive norms and causal relationships. A 'baseline' thus established serves as a reference to which perturbations in the nutrient levels can be compared to evaluate whether the level is a normal variation or an abnormality. The estuarine waters are the principal sources of the major elementary components of estuarine organisms: carbonate, phosphate and nitrate ions. While added amounts of phosphates and nitrates serve to increase the fertility of the estuary, excessive amounts result in algal blooms and accompanying anoxic conditions. Excessive nutrient levels result in degradation of water quality and are therefore used as indicators of pollution. One objective of the Mississippi Sound research effort was to ascertain the temporal and spatial distribution of nutrients.

Citation 126

ENGLER, R. M. , D. A. ANTIE, W. H. PATRICK, JR.

Research Soil Scientist, Dep. of the Army, Corps of Eng. , Waterways Exp. Stn. , Environ. Effects Lab. , Vicksburg, MS 39180

Effect of Dissolved Oxygen on Redox Potential and Nitrate Removal in Flooded Swamp and Marsh Soils

J Environ Qual

1976,5(3),230-235.

English

The O_2 depletion rates, NO_3^- loss, and the effects of added O_2 on NO_3^- disappearance and redox potential in four flooded or intermittently flooded soils from the swamp and coastal marshes of Louisiana were quantitatively characterized in a laboratory study. The NO_3 added either to the shallow floodwater or mixed with the soil in a suspension rapidly disappeared. Eighty to ninety parts per million NO_3 was lost from the soil suspensions in 1 to 4 days and from the floodwater over a soil in 10 to 20 days. No NO_3^- was lost from floodwater separated from the soils. Oxygen depletion in the soil suspensions occurred in 15 minutes to 4 hours. Redox potential curves exhibited a characteristic inflection after O_2 disappearance in all soils studied. Nitrate disappearance did not appear to be inhibited by as much as 16 ppm O_2 dissolved in the soil suspensions because the O_2 was rapidly consumed.

Citation 127

ENGLER, R. M. , W. H. PATRICK, JR.

Research Soil Scientist, Dept. of Army, Corps of Engineers, Waterways Experiment Station, Environmental Effects Lab. , Vicksburg, MS 39180

Nitrate Removal from Floodwater Overlying Flooded Soils and Sediments

J Environ Qual

1974,3(4),409-413.

English

The floodwater NO_3 removal rate of intermittently-flooded fresh water swamp soils and continuously-flooded saline marsh soils of southern Louisiana was quantitatively characterized in a laboratory study. Of the two areas studied, the marsh area was the more effective sink for NO_3 contaminated waters with an average initial removal rate of 9.15 ppm N/day. After correcting for the rate of NO_3 diffusion, the microbial NO_3 removal rate was calculated to be 7.64 ppm N/day. The swamp soil had a removal rate of 4.38 ppm N/day. The microbial NO_3 removal rate for this area, after correcting for diffusion, was 2.5 ppm N/day. Studies on samples of floodwater separated from the soil showed the active site of microbial NO_3 reduction to be the soil-water interface or within the soil, but not in the floodwater. Additions of organic matter to a mineral soil flooded for rice (Oryza sativa L.) culture decreased the thickness of the aerobic-anaerobic zone at the soil-water interface and increased the rate of NO3 reduction.

Citation 128

EPPLEY, R. W. , C. SAPIENZA, E. H. RENGER

Institute of Marine Resources A-018 University of California, San Diego, La Jolla, CA 92093

Gradients in Phytoplankton Stocks and Nutrients off Southern California in 1974-76

Estuarine Coastal Mar Sci

1978,7,291-301.

English

Standing stocks of phytoplankton and other particulate matter in Southern California coastal waters show an onshore (high) to offshore (low) gradient. Much of the spatial and temporal variability in the standing stocks is related to changes in the vertical concentration gradient of nutrients and is reflected in sea surface temperature anomalies. At shallow inshore stations the nitrate distribution at the bottom of the euphotic zone is in accord with Riley's 'model of nutrient conditions in coastal waters'.

Citation 129

EPPLEY, RICHARD W.

Institute of Marine Resources, Scripps Institute of Oceanography, University of California, San Diego, CA

Eutrophication in Coastal Waters: Nitrogen as a Controlling Factor

1971,16010 EHC , 67p.

English

The role of southern California coastal sewage outfalls in the eutrophication of local sea water was investigated. The outfall effluents have a measureable influence on standing stocks of phytoplankton, and on primary production. Two cruises were undertaken, in July, 1970, and June, 1971. Kinetic parameters for the assimilation of ammonium, nitrate and urea were determined at the outfall sites using 15N-labelled substrates. These parameters will be usefull for simulation models of phytoplankton growth as influenced by local sewage effluents. The utilization of various forms of nitrogen by phytoplankton, mechanisms and rates of nitrogen assimilation and enzymes of nitrogen assimilation were found to vary from day to night as does the capacity for photosynthesis when cultures were grown on light-dark cycles simulating natural illumination (Eppley - UCSD).

Citation 130

FAHY, EDWARD , ROGER GOODWILLIE, JOHN ROCHFORD, KELLY DAVID

Natl Inst for Physical Planning, Waterloo Rd, Dublin 4 Eire, Ireland

Eutrophication of a Partially Enclosed Estuarine Mudflat

Mar Pollut Bull

1975 (Feb),6 (2),29.

English

Some 130 years ago Rogerstown Estuary, about 25 km north of Dublin, Ireland, was partly cut off from the sea by a railway causeway. Mudflats that formed became an important feeding ground for wildfowl. In recent years the estuary has become subject to increasing amounts of organic pollution. Algal growth has increased, and further nutrient increases may cause undesirable extension of algal mats. The Rogerstown Estuary environment is described. (1 graph, 2 maps)

Citation 131

FANNING, K. A. , M. E. Q. PILSON

University of South Florida, St. Petersburg, Marine Science Inst.

The Lack of Inorganic Removal of Dissolved Silica During River-Ocean Mixing

Geochim Cosmochim Acta

1973,37(11),2405-2415.

English

The significance of the inorganic removal of dissolved silica from estuarine zones was investigated at 3 river mouths: the Orinoco (Venezuela), the Savannah and the Mississippi. Particular attention was given to the Mississippi river plume, where extensive inorganic silica uptake had been reported. Mixing curves and laboratory dilution experiments provided little evidence that the phenomenon was widespread. Because of an uncertain fresh water tie point, some inorganic uptake could not be completely ruled out for the Orinoco, but in the plumes of the Savannah and Mississippi rivers, no inorganic silica removal was indicated. In contrast to published experiments on river sediments, laboratory dilution studies on suspended matter from the Mississippi river showed release of dissolved silica instead of uptake.

Citation 132

FARMER, R. C. , W. R. WALDROP, F. H. PITTS, K. R. SHAH

Louisiana State Univ. , Baton Rouge, Dept. of Chemical Engineering

Development of a Three-Dimensional Time-Dependent Flow Field Model

NASA

1975(Jan), NASA-CR-120762,88p.

English

A three-dimensional, time-dependent mathematical model to represent Mobile Bay was developed. The objective of this study was to develop computer programs which would numerically solve the appropriate conservation equations for predicting bay and estuary flow fields. The model will be most useful for analyzing the dispersion of sea water into fresh water and the transport of sediment. Also, the model serves as a useful tool for relating field and physical model data. The unique feature of this model is that it correctly accounts for momentum transfer in the governing flows, thereby making it far more realistic than any previously devised. NASA's ERTS and Skylab programs resulted in high quality photographs of Mobile Bay. U. S. Army Corps of Engineers have also studied this bay extensively All these data have been reviewed for comparison to this mathematical model. The computer program listing is contained in the appendix.

Citation 133

FAUST, M. A. , D. L. CORRELL

Smithsonian Institution, Edgewater, MD, Chesapeake Bay Center for Environmental Studies

Comparison of Bacterial and Algal Utilization of Orthophosphate in an Estuarine Environment

Mar Biol

1976,34(2),151-162.

English

In an effort to overcome lack of information about the role of various microorganisms in the process of phosphorus cycling in estuarine environments, finer-controlled filtration and microscopy was used to distinguish between bacterial and algal utilization of orthophosphate by plankton in the Rhode River subestuary of Chesapeake Bay. The differential filtration technique incorporated tests with flow filters of 5.0,1.2 and 0.45 micrometer pore size. Light microscopy examination revealed that most of the bacterial population passed through a 5.0 micrometer filter while most algae were retained. Phosphorus uptake by algae and bacteria was closely correlated with cell biomass. Phosphorus uptake by algae was high only in the summer months where P-uptake was correlated with temperature or dissolved orthophosphate, total organic phosphate or total phosphate concentrations. Algal cell numbers had a high correlation with bacterial cell numbers (0.950) as did the algae and bacteria biomass (0.902) though high standard deviations from the means were found. The rate of P-uptake from water by algae and bacteria varied with season and with the species composition of the natural population. Bacterial and algal cell numbers and biomass were estimated in all experiments.

Citation 134

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

Philadelphia, PA

Delaware Estuary Comprehensive Study Preliminary Report and Findings

Fed Water Pollut Control Admin

1966(July),113p.

English

The Delaware river estuary - particularly the segment between Trenton and the Pensylvania-Delaware state line below Wilmington - was studied from the points of view of municipal and industrial waste discharges, water quality and its improvement by five specific alternative objective sets, water use, costs and benefits of projected improvements, and guidelines for implementation. Stormwater overflow discharges (discussed on pp 24,61,92) are considered esthetically objectionable, although in comparison with other waste input it does not constitute a large source of oxygen-demanding pollution of the estuary. A continuation of the reported stormwater sampling program is urged, and a demonstration project to counteract undesirable effects of combined sewer overflow is recommended.

Citation 135

FERGUSON, R. L. , M. B. MURDOCH

National Marine Fisheries Service, Beaufort, NC, Atlantic Estuarine Fisheries Center

Microbial ATP and Organic Carbon in Sediments of the Newport River Estuary, North Carolina

Estuarine Res

1975,1,229-250.

English

Methods for the quantitative estimation of the standing crops of organic carbon in sediment communities (allochthonous detritus, detritus, heterotrophic and autotrophic microbes, and microbial fauna) were devised. Seasonal surveys of microorganism, macroscopic infauna, and nekton biomass in the Newport River Estuary, North Carolina, are being made. Standing crops of carbon in heterotrophic and autotrophic microorganisms in water and sediments were estimated from adenosine triphosphate (ATP) and chlorophyll-a measurements. ATP was extracted with boiling tris (hydroxymethyl) aminomethane buffer. The extraction efficiency from sediment was approximately 47%. ATP was strongly absorbed by acid-washed clay, but ATP extractability from natural sediments was independent of its clay content. Instrumentation for the determination of as little as 0.0005 micrograms of ATP per ml of extract and a hand-coring device for collecting samples of shallow water sediment are described. The standing crop of heterotrophic microbes increased 8.4-20.9 g c/sq m from winter to summer in the upper 15 cm of sediment over the whole estuary. This increase was associated with a drop in detritus and increase in macroscopic infauna. Implications of seasonal carbon distributions in detritus, microbes, and infauna are discussed in relation to the apparent carbon flows through the detritivore food web.

Citation 136

FINGER, JAMES H. , T. ALLEN WASTLER

Tampa-Hillsborough Bay Technical Assistance Project, Tampa, FL, and Federal Water Pollution Control Administration, Washington, DC, Office of Estuarine Studies

Organic Carbon-Organic Nitrogen Ratios of Sediments in a Polluted Estuary

J Water Pollut Control Fed

1969(Feb),41(2), R101-109.

English

The observed ratios of organic carbon-organic nitrogen in natural environments are used to differentiate between sludge deposits of industrial waste origin and those from human wastes. Field results from Charleston Harbor show deposits of both types in separate areas and mixtures of sludge deposits in some locations in the harbor. The C/N ratio of domestic wastewater deposits is approximately 10, while that in deposits from untreated paper mill waste is 40.

Citation 137

FINNISH MARINE RESEARCH

Inst. of Marine Research, P. O. Box 14 166, SF-00141, Helsinki 14, Finland

Proceedings of the Finnish-Swedish Seminar on the Gulf of Bothnia VAASA, Finland, March 8th-9th, 1978

Finnish Marine Res

1978, No. 244,236p.

English

The objectives of these joint research activities are to state long-term changes in the hydrographical, hydrochemical, biological and sedimentological conditions of the Gulf of Bothnia, to study the present state of the Gulf of Bothnia, especially pollution, and to investigate the material balance of this sea area.

Citation 138

FISH, R. , J. SAVAGE

Partners, UK

An Outline Scheme for Reuse of Mogden Sewage Effluent

Water Serv

1974 (Sep),78 (943),300.

English

The possibilities of arranging for the reuse of effluents discharged into estuaries and other tidal waters by diverting them inland are explored. A scheme designed to give maximum possible extent and flexibility is outlined. Cost estimates are included. (3 maps)

Citation 139

FISHER, W. S.

California Univ. , Bodega Bay, Bodega Marine Lab

Relationships on Epibiotic Fouling and Mortalities of Eggs of the Dungeness Crab (Cancer magister)

J Fish Res Board Can

1976,33,2849-2853.

English

This study describes the close association of epibiotic microbial fouling on the eggs of Cancer magister and egg mortalities. Laboratory experiments showed that nutrient enriched sea water increased the number of measurable filaments on the egg surface and increased the number of egg mortalities. Chemotherapeutic treatment of the sea water decreased the number of filaments and mortalities. The use of antibiotics decreased the number of mortalities while the number of filaments steadily increased, suggesting that antibiotic-sensitive, nonfilamentous forms may be substantially responsible for mortalities caused by microbial fouling. Darkness and ultraviolet irradiation of the sea water had no significant effects on filaments or egg mortalities. Both filamentous fouling and egg mortalities described exponential declines with increased depth into the egg masses.

Citation 140

FLEMER, D. A. , D. R. HEINLE

Maryland Univ. , Solomons, Chesapeake Biological Lab

Effects of Waste Water on Estuarine Ecosystems

Chesapeake Research Consortium, Inc.

1974, CRC Publication No. 33,16p.

English

Recent increases in algae, measured as concentration of chlorophyll a, in the Patuxent River estuary appear to have occurred as a consequence of increased loading by sewage in the upper watershed. The increases in concentration of chlorophyll were observed downstream from the turbid sediment-trap portion of the estuary, an impact distant from the points of addition. Primary production, measured by the 14C method, increased also as did zooplankton biomass. Samples of water from the Sandy Point area of the upper Chesapeake Bay were enclosed in 750-liter (200-gallon) polyethylene microcosms, enriched with treated sewage, and ensuing events followed. While the predictions from the microcosms have not been fully validated, clear effects on several parameters were noted. Phosphate appeared to be the major limiting nutrient in these experiments. Enriched microcosms developed higher concentrations of zooplankton and chlorophyll a and rates of primary production, permitting predictions of effects of the sewage treatment plant under various loads.

Citation 141

FLEMER, DAVID A. , HEYWARD D. HAMILTON, CAROLYN W. KEEFE, JOSEPH A. MIHURSKY

Maryland Univ. , Solomons, Natural Resources Inst.

The Effects of Thermal Loading and Water Quality on Estuarine Primary Production

NRI Maryland

1970 (Dec), NRI-REF-71-6,223p.

English

Data on the hydrography, nutrient chemistry, primary production, standing crops of phytoplankton and zooplankton, and the effects of entrainment on the phytoplankton-bacteria community by a power plant in the upper Patuxent estuary are reported for the period August 1968 to August 1970. Calculated primary production ranged from 0.01 to 5.77 g per sq. cm per day and the spacial pattern was inversely related to turbidity and the volumetric measurements of productivity. Maximum penetration of high nutrient levels into the estuary occurred during the winter. Nutrient concentrations were high and comparisons with earlier published data indicate accelerated rates of nutrient input. Published information on intake - effluent studies showed that the power plant can cause a significant reduction in the standing crop and photosynthetic rates of entrained organisms. Preliminary studies were made on the species composition, chemical content, biomass and production of marsh vegetation. Final rept. , Aug 68 -Aug 70

Citation 142

FLINT, K. P. , J. W. HOPTON

Dep. Microbiol. , Univ. Birmingham, Birmingham, Engl.

Seasonal Variation in the Phosphatase Activity of Waters and Sewage Sludges

Eur J Appl Microbiol

1977,4(3),205-215.

English

The alkaline phosphatase (I) activity of water from 8 locations differing in PO4-3 concentration was determined from late autumn to late summer. Evidence for induction/repression effects was conjectural, but cellular activity was highest in the environment of lowest PO4-3 concentration. Environments were sampled and the pH/I profiles constructed. The pH of maximum activity of low PO4-3 environments was in the acid region whereas the pH of high PO4-3 environments was in the alkaline region. There was little difference in the character and distribution of constitutive I in representative bacterial cultures from high and low PO4-3 environments. The I activity of a water at a particular time will be influenced by nutrient and physicochemical status as well as ambient PO4-3 concentration.

Citation 143

FOLKARD, A. R. , P. G. W. JONES

Ministry of Agriculture, Fisheries and Food, Fisheries Lab, Lowestoft, Suffolk, UK

Distribution of Nutrient Salts in the Southern North Sea during early 1974

Mar Pollut Bull

1974 , 5 (12),181-185.

English

Nutrient salt surveys in the southern North Sea have shown that the level of phosphate and nitrate off the continental coast during January, 1974, was two to three times higher than during the same period in 1962. The level of phosphate has also increased in the Thames Estuary but to a lesser degree. It is suggested that these increases are related to the discharge of waste material from terrestrial sources and that such changes must be considered in the context of eutrophication in the southern North Sea.

Citation 144

FOREE, EDWARD G. , CHARLES REECE SCROGGIN

University of Kentucky, Water Resources Institute, Lexington, KY

Carbon and Nitrogen as Regulators of Algal Growth in Treated Sewage

WRI Kentucky

1972, Research Rep. No. 49,60p.

English

Continuous flow algal cultures were grown under three different growth conditions using secondary sewage treatment plant effluent as the growth medium. The only variable within each run was the hydraulic residence time. The concentrations of growth regulating nutrients were varied between the runs so comparisons of the algal mass, composition, nutrient uptake, and genera could be made. The importance of CO2 availability for algal growth was also studied. A kinetic theory which based algal growth on cellular nutrient concentration was verified. The second phase of the study was a batch culture study in which the same growth medium was used as in phase 1. The objective of Phase 2 was to investigate significant similarities and differences between continuous and batch culture growth under otherwise similar growth conditions. Carbon dioxide enriched conditions produced as much as ten times the algal mass as CO2 deficient conditions. Algal blooms dominated by blue-green algae were found to be the result of a successional change from green to blue-green algae under CO2 enrichment, nitrogen limited conditions. In the batch culture study algae exhibited a luxuriant nitrogen uptake.

Citation 145

FRECKER, MAXINE F. , CHARLES C. DAVIS

Dept. of Biology, Queen's University, Kingston, Ontario, Canada

Man-made Eutrophication in a Newfoundland (Canada) Harbour

Int Revue ges Hydrobiol

1975,60(3),379-392.

English

A comparative study in 1969-1970 of the phytoplankton and certain other parameters in St. John's Harbour and Aquaforte Harbour, located on the southeast coast of Newfoundland, led to the conclusion that St. John's Harbour which receives untreated sewage as a prime source of nutrients was by far the more eutrophic. Evidence for the eutrophic state was especially observed in the central basin (Station 1) of the harbour. Here the bottom waters were deficient in oxygen especially during the summer months. Secchi disc readings were generally lower at this station, and the annual standing crop of phytoplankton was almost three times that at unpolluted Aquaforte Harbour. Also the proportion of the biomass contributed by the nannoplankton was greater in St. John's Harbour. One euglenoid occurred in bloom concentrations throughout the summer months and may possibly be considered as an indicator of organically-polluted waters.

Citation 146

FREEMANTLE, M. H. , N. HULINGS , M. MULQI , E. C. WATTON

Faculty of Science, Univ. of Jordan, Amman, Jordan

Calcium and Phosphate in the Jordan Gulf of Aqaba

Mar Pollut Bull

1978,9(3),79-80.

English

Water and sediment samples taken from near the Port of Aqaba have been examined for calcium and phosphate in order to determine the effect of phosphate rock dust on the Jordan Gulf of Aqaba. Normal values for calcium and phosphate were found except near the town's sewage outlet where the phosphate was relatively higher.

Citation 147

FRONTIER, S.

Office de la Recherche Scientifique et Technique Outre-Mer, Nosy-Be (Madagascar). Centre Oceanographique (ORSTOM) de Nosy-Be

Zooplankton of the Region of Nosy-Be: V. Cladocera: Contribution to the Study of a Tropical Eutrophic Bay

Cah ORSTOM Ser Oceanogr

1973,11(3),259-272.

French

Spatiotemporal variations of the populations of Penilia avirostris and Edvane tergestina are discussed. The 2 spp. belong to the internal neritic settlement; the former is more strictly coastal than the latter. The populations develop very fast in the bays (Malagasy Republic) after the 1st heavy rains (Dec.). They reach a 1st maximum level in Feb. -March and a 2nd in July-Aug separated by an interseasonal decrease. The 1st maximum is the principal maximum for Evadne. The situation is opposite for Penilia. The populations decrease drastically in Sept. During stratification of the neritic water (wet season), Evadne remains generally in the more superficial layers than Penilia. With the surface drifting toward the open sea and the estuarine circulation prevailing at this time of the year it sweeps Penilia towards the external neritic zone. Cladoceran populations seem to follow closely the abundance variations of phytoplankton, the later being directly affected by river flow. They are an essential link in trophic chains because of the filtration power they represent.

Citation 148

GAMESON, A. L. H. , I. C. HART

Water Pollution Research Lab. , Stevenage (England)

A Study of Pollution in the Thames Estuary

Chem Ind (Lond)

1966(Dec 17),2117-2123.

English

An investigation was begun in 1949 to provide information on which recommendations could be based for reducing the pollution of the Thames Estuary. The main objectives were to determine effects of various factors on distribution of dissolved oxygen, and to develop methods by which this distribution could be predicted for any combination of conditions that might arise. The condition of the middle (most polluted) reaches of the Thames Estuary, as judged by the dissolved oxygen content of the water, showed a marked improvement at the beginning of 1964, following the installation of the secondary treatment plant in Southern Outfall Sewage Works; this improvement was maintained throughout 1964-1965. The lower reaches have shown no improvement and satisfactory conclusions for this have not been reached as many factors are involved. Among them are deposition of organic solids, removal by dredging, changes in dredging, possible return of oxidizable matter to the estuary, variations of sampling methods, and longitudinal mixing. The marked deterioration in 1949-1950 is attributable to the widespread introduction of synthetic anionic detergents. In

1964-1965 there was no anaerobic reach established at any time, a situation that had not existed for several decades.

Citation 149

GARDNER, L. R.

Clemson Univ. , South Carolina Dept. of Chemistry and Geology

Exchange of Nutrients and Trace Metals Between Marsh Sediments and Estuarine Waters - A Field Study

WRRI South Carolina

1976(Sept), Report No. 63,95p.

English

Some of the effects of marshes on the quality of adjacent coastal waters are described and some of the mecahnisms of materials exchange between marshes and estuaries are identified. Data were collected on the quantity and quality of runoff from marshes during low tide exposure and on the chemistry of interstitial waters and marsh sediments. The results indicate that marshes export phosphorous and silica in amounts comparable to the supply of these elements by terrestrial stream flow and that marshes take up Cu, Zn and Mo but at rates so low that the effect on the concentrations of these elements in coastal waters is immeasurably small. The export of silica and phosphorous from marshes is due chiefly to the diffusion of these substances from the sediment into a thin layer of water on the marsh surface that slowly drains during low tide exposure. A mathematical simulation of the process was formulated which qualitatively fits the observed pattern of silica concentration in the runoff.

Citation 150

GARDNER, W. S. , J. A. STEPHENS

Stability and Composition of Terrestrially Derived Dissolved Organic Nitrogen in Continental Shelf Surface Waters

Mar Chem

1978,6(4),335-342.

English

Twenty surface water samples obtained from a 100 km transect in the seaward direction from Savannah Sound, GA, were analysed for dissolved organic carbon (DOC) and nitrogen fractions to assess the stability or availability of dissolved organic nitrogen (DON), transported by rivers into coastal waters. A linear decrease in both organic carbon and nitrogen with increasing salinity was observed. It was inferred that most biological and chemical changes affecting river-derived DOC and DON had occurred by the time the river water reached the shore line. The organic matter entering the continental shelf region appeared to be relatively stable with C/N ratios and amino nitrogen composition resembling those of soil organic matter.

Citation 151

GENOVESE, S.

Institut d'Hydrobiologie, Universite de Messine, Italie

Eutrophication Recent Directions for New Perspectives

Rev Int Oceanogr Med

1973,29,53-61.

English

It becomes obvious that the concept and the word of eutrophy has undergone an evolution. In the beginning, it pointed out, according to its etymology, a natural and optimal condition of a stretch of water, characterized by its wealth of nutritive substances. Now, on the contrary, the word of eutrophication is employed only to indicate pollution conditions which are due whether to an excess of organic substances or to the action of man. This has led us to consider new studies and experiments on samples of freshwater, marine water of some little lakes and estuary areas, brackish water lagoons, in order to use this great potential of nutritive wealths at different levels of trophic chain.

Citation 152

GIESKES, W. W. C. , A. J. VAN BENNEKOM

Netherlands Institute for Sea Research, Texel, Netherlands

Unreliability of the 14C method for Estimating Primary Productivity in Eutrophic Dutch Coastal Waters

Limnol Oceanogr

1973,18(3),494-495.

English

Secretion of mucus by colony-forming algae may contribute to the underestimation of primary productivity with the 14C method if only the particulate, not the dissolved organic, fraction is taken into account. Silicate enrichment from glass 14C ampoules may lead to overestimation.

Citation 153

GIESKES, W. W. C. , G. W. KRAAY

Netherlands Inst. Sea Res. , Texel, Netherlands

Continuous Plankton Records: Changes in the Plankton of the North Sea and its Eutrophic Southern Bight from 1948 to 1975

Neth J Sea Res

1977,11(3-4),334-364.

English

Patterns of long-term variability in the plankton of the North Sea were remarkably uniform over large areas. Patterns of annual variation in the herbivorous zooplankton were not related to those in the phytoplankton. In the southern North Sea the decrease in copepod numbers between 1960 and 1966 did not correspond with a change in the number of diatoms registered by the Continuous Plankton Recorder; the decline in this latter group did not start before the mid sixties. Phytoplankton groups that contributed to the coloration of the silks but were not recorded in the analysis of C. P. R. samples (e. g. microflagellates, small or fragile diatoms) came to profusion in spring and early summer all over the North Sea during the late sixties and early seventies; and during the last 5 years dinoflagellates were much more abundant than usual all over the southern North Sea. The gradual decrease in abundance of the colonial u-flagellate Phaeocystis poucheti between 1948 and 1970 and the delay in the spring production of Temora and Acartia since the early fifties may have been related to the decline of sea temperature on the European shelf reported in the literature; but in the southern North Sea the annual fluctuations in the phytoplankton did not correspond to temperature variations in any season. The increasing green coloration of the Recorder silks showed some resemblance to a trend of increasing solar fluctuations in the survey region most under the influence of the eutrophic Rhine water were similar to those in adjacent areas. However, the decrease in diatoms and in copepods was less dramatic than elsewhere, while the increase in microflagellates and other unidentified species between 1966 and the early seventies was greater than in any other region. It is possible that the increased fertilization of this area has stimulated phytoplankton and zooplankton production in the eastern part of the Southern Bight. However, the natural long-term variability can still be recognized clearly. (abbrev.)

Citation 154

GILES, M. S.

Australian Atomic Energy Commission Research Establishment, Lucas Heights

A Study of the Movement of Phosphorous in the Little River Estuary, NSW

Aust Atomic Energy Comm Res Estab

1972(Oct), Rep. AAEC/TM-616,22p.

English

Knowledge of the physical and biological modes of dispersion of radioactivity and of how released radioactivity can progress through food chains, sometimes with a concentration factor, is necessary in order to determine the rates at which the various steps in this cycle occur so that dispersion or concentration may be predicted. The estuary of the Little River, NSW was mapped and measurements made of phytoplankton productivity, phosphorus content, chlorophyll-a content, zooplankton biomass, salinity, temperature, and oxygen content. Phosphorus-32 and hydrogen 3 were injected into the estuary and the rate of phosphorus-32 movement into the phytoplankton and zooplankton calculated. Soluble P-32 in the estuary moved rapidly into the phytoplankton with a turnover time of about two hours. Phosphorus-32 incorporated into the phytoplankton was found to be dispersed and diluted in the same way as tritiated water released at the same time. Movement of P-32 into the zooplankton was much slower. During a tidal phase of the estuary, P-32 taken up by the phytoplankton (comprising at least 90% of the total isotope released) was flushed from the system. During the same phase P-32 in the zooplankton was retained in the estuary.

Citation 155

GILMARTIN, MALVERN, NOELIA REVELANTE

Center for Marine Studies, University of Maine, Orono, ME 04473

The Phytoplankton Characteristics of the Barrier Island Lagoons of the Gulf of California

Estuarine Coast Mar Sci

1978,7,29-47.

English

The eastern coast of the Gulf of California, a marginal sea of the Pacific Ocean, is almost continuously bordered by extensive coastal lagoons. Fifteen representative lagoons were compared with the open Gulf during the season of lowest upwelling, highest temperatures, and at the end of the low rainfall season. A positive correlation between lagoon flushing rates, nutrients, chlorophyll a biomass (to >19.5 mg m-3), and primary production (to >185 mg C m-3 h-1) was established, apparently related to lagoon trapping of nutrients and/or anthropomorphic eutrophication, as well as a positive correlation between lagoon assimilation numbers (to >12.5) and temperature (to >31 C). Gradients of lagoon primary production characteristics (phytoplankton community composition, chlorophyll a biomass, primary production, assimilation numbers, and nutrient levels) indicated that the lagoons were markedly influencing the inshore waters of the eastern central Gulf of California. Supporting data on the distribution of phytoplankton species in the Gulf and lagoons, diversity indices, degree of dominance, and nano: microplankton ratios are provided.

Citation 156

GLEESON, SANDRA A. , JANE F. STAUBLE

Virginia Institute of Marine Science, Gloucester Pt. , Virginia 23062

The Chesapeake Bay Bibliography, Vol. 4, Virginia Waters

VIMS

1976(Dec), Special Sci. Rep. No. 80.

English

Compared to previous volumes, the Chesapeake Bay Bibliography-Volume IV: Virginia addresses a larger geographic and subject study area. Not only does this volume include and update the water resource-oriented citations contained in volume I and II, but it also identifies information sources dealing with the land resources of Virginia's nine coastal planning regions. This enlargement reflects the growing concern over land and water resource interrelationships, and was made to help meet the information needs of government and citizen groups involved in Virginia's Coastal Resources Management Planning Program. Subsequent volumes of the bibliography will seek to update and improve this information base.

Citation 157

GOERING, JOHN J.

Institute of Marine Science, Univ. of Alaska, College, AL

The Role of Nitrogen in Eutrophic Processes

In: Water Pollution Microbiology. Edited by Ralph Mitchell. Wiley- Interscience

1972, Chapt. 3,43-68.

English

There appears to be a delicate balance in aquatic freshwater and marine ecosystems between nutrients and organismal growth. A simplified diagram of the balanced flow of nitrogen through such a system is presented. If nutrients are limited, as in oligotrophic waters, the balance is maintained (ie, the system is essentially in steady state). Also as the water increases its nutrient content by natural or artificial fertilization the individual components (ie, plankton, bacteria, zooplankton, ammonium, etc.) of the system increase in size but remain in balance. Eventually, however, in late eutrophication, the balance is lost and large increases in the phytoplankton standing stock take place. McCoy and Sarles(76) suggest that the imbalance results from physical restraints of the habitat on the maximum size of the bacterial population. This would set an upper limit on the rate of nutrient assimilation by bacteria but not by phytoplankton. Thus, when the bacterial population reaches its maximum, the phytoplankton could use any excess nutrient over that needed to maintain the maximum steady state bacterial population and their own steady-state population to increase their standing stock, and the system would then become unbalanced.

Citation 158

GOLDBERG, EDWARD D. , JOHN J. GRIFFIN, VERN HODGE, MINORA KOIDE

Geol. Res. Div. , Scripps Inst. Oceanogr. , La Jolla, CA

The Pollution History of the Savannah River Estuary

Scripps Inst. Oceanogr.

1978, NUREG CR0082,42p.

English

Records of natural and pollutant fluxes to the Savannah River Estuary found in some river and marsh deposits into which time frames are introduced by 210Pb or Pu geochronologies. Pu releases from the Savannah River Plant are evident in 1 marsh deposit and in marsh grass which received the transuranic element from atm. transport. The pollution records are disturbed by bioturbative activities of organisms, by the input of marine solids to the estuarine deposits, and by dumping and dredging in the river.

Citation 159

GOLDMAN, CHARLES R. , JAMES MCEVOY III, PETER J. RICHERSON

University of California, Davis

Environmental Quality and Water Development

W. H. Freeman and Company, 660 Market Street, San Francisco, CA 94104

1973,500p.

English

A History of Water Development and Environmental Quality, Rivers and Americans; A Century of Conflicting Priorities, Psychological Response to the Environment, The Measurement of Environmental Quality and its Incorporation into the Planning Process, The American Public's Concern with the Environment, Public Opinion in Planning Water Development, Impact Analysis and the Planning Process, Watershed Program Lacks Ecological Dimensions, Ecological Impacts of Water Storage and Diversion Project, Demographic Effects of Water Development, Protection of Environmental Quality in Estuaries, Man's Effect on the Great Lakes, Lake Washington, Skippack Watershed and the Evansburg Project: A Case Study for Water Resources Planning, Innovations in Water Resource Planning; Creating and Communicating Discernible Alternatives, Water Development and Urban Recreation, Wisconsin's Shoreland Protection Program: A State-Local Regulatory Approach to Natural Resource Preservation, The Economics of Water Development and Environmental Quality, The Role of the Technical Expert in Decision-Making, Decision-Making at Local, State, Federal, and International Levels, Some Political Aspects of the Relationship Between Large Scale Inter-Basin Water Transfers and Environmental Quality, Alternatives in Water Project Planning: Ecological and Environmental Considerations, Bodega: A Case History of Intense Controversy, Water Development: A European Experience, Case Description: Morrison Creek Stream Group Basin, Critique of Water Resources Council's Proposed Principles and Standards for Planning Water and Related Land Resources.

Citation 160

GOLDMAN, J. C.

Woods Hole Oceanographic Institution, MA

Identification of Nitrogen as a Growth-Limiting Nutrient in Waste-Waters and Coastal Marine Waters Through Continuous Culture Algal Assays

Water Res

1976,10(2),97-104.

English

Nitrogen can often be a growth limiting nutrient in both waste waters and in coastal waters in which the major contribution of nutrients originates from domestic waste discharges. The results of continuous culture algal assays on waste water-sea water mixtures supporting this view are reported. Analytical expressions are presented that give the limiting nutrient present in a given water. Two series of assays were conducted on waste waters from the coasts of Massachusetts and Rhode Island. In the first series waste waters representing different degrees of treatment were added to sea water in volume ratios of 1:3 and 1:1 waste water / seawater In the second series, ratios were reduced to 1:12 and 1:6.5. Waste water was collected at the treatment facilities and mixed with sea water in the desired ratios in the laboratory. All indigenous algae were removed and the particular test algae were added. Particulate nitrogen, ash-free dry weight, and particulate phosphorus were measured to determine algal biomass. The results show that nitrogen is the growth-limiting nutrient in the waste waters studied and in the marine waters receiving these wastes. There was a linear relationship between total inorganic nitrogen in the influent and particulate nitrogen representing algal biomass up to a total inorganic nitrogen-phosphorus ratios in the test algae varied between 10 and 20 and in the sea water they varied between 4 and 12. Phosphorus had little effect on algal growth. The elimination of phosphate free detergents will have little effect on the degree of eutrophication in coastal waters.

Citation 161

GOLDMAN, J. C. , K. R. TENORE, H. I. STANLEY

Woods Hole Oceanographic Institution, MA

Inorganic Nitrogen Removal from Wastewater: Effect on Phytoplankton Growth in Coastal Marine Waters

Science

1973(June),180(4089),955-956.

English

Algal bioassays were used to demonstrate the high efficiency of a combined tertiary wastewater treatment and marine aquaculture system in removing inorganic nitrogen, and to show that the coastal waters off Woods Hole, Massachusetts, are limited in nitrogen for marine phytoplankton growth. When nutrients were removed from secondarily treated domestic wastewater through assimilation by phytoplankton in an outdoor growth pond, the pond effluents, in varying dilutions with seawater, could not support more phytoplankton growth than the seawater alone. However, when nitrogen was added back to the mixtures of pond effluent and seawater, the phytoplankton growth response was similar to that with a mixture of wastewater and seawater. This is similar to the findings of other researchers, and suggests that nitrogen may be the key growth-limiting nutrient in many coastal marine waters. The combined tertiary treatment-marine aquaculture system appears to be an effective means of removing nitrogen from secondarily treated wastewater and controlling eutrophication of coastal marine waters.

Citation 162

GOLOVKIN, A. N. , G. P. GARKAVAYA, I. V. CHURBANOVA

Murmanskii Morskoi Biologicheskii Institut (USSR)

Influence of Mussel Metabolites on the Dynamics of Nutrients in the Coastal Waters of the Eastern Murman Coast

Okeanologiya

1976,16(3),451-456.

Russian

Hydrochemical surveys were made in the Porchnikha and Vyselkovskaya (southern) USSR gubas (inlets) in July-Aug. , 1971 and 1972, to determine the influence produced by the populations of East Murman mussels on the hydrochemical regime of the littoral zone. The highest phosphate, organic P and organic N concentrations were characteristic of the areas corresponding to the water level during the low tide or the initial phase of the high tide, ie, places with the most dense mussel populations. Growth in NO3 concentrations was not related to mussel grounds. A noticeable enrichment of water with phosphates at the initial phase of the high tide may originate from mussel metabolites accumulated during drainage in the mantle cavity as corroborated by calculations. The observations made in the 1972 mass mussel mortality showed that no growth in phosphate concentrations occurred at the initial phase of the high tide. Sharp changes in the content of nutrients in the coastal water may evidently be attributed to their isolation by mass organisms.

Citation 163

GOULD, D. J. , M. R. FLETCHER

Water Research Centre, Stevenage Laboratory, Elder Way, Stevenage, England

Gull Droppings and Their Effects on Water Quality

Water Res

1978,12,665-672.

English

Droppings collected over periods of 24 h. from four species of captive gulls of the genus Larus, were examined for total coliforms, faecal coliforms, faecal streptococci and Clostridium perfringens. Samples were also monitored for salmonellae and representative groups of samples analyzed for nutrient content. The occurrence of several types of droppings, characterized by their colour and consistency, was recorded. Daily loads of coliform bacteria indicated that the outputs of the two larger species of gull approximated to values quoted for man; values for other indicator bacteria were however considerably lower in all gull species. Salmonellae were not detected. Daily loads of Kjeldahl nitrogen from each bird varied from 608 to 1819 mg, and total phosphorus from 3 to more than 115 mg, according to species.

Citation 164

GOULDER, R.

Department of Plant Biology, University of Hull, England

Attached and Free Bacteria in an Estuary with Abundant Suspended Solids

J Appl Bacteriol

1977,43(3),399-405.

English

Metabolic measurements of free bacteria and bacteria attached to the high concentrations of suspended solids in the Humber estuary were made. Comparisons revealed higher concentrations of attached bacteria as well as a higher potential for glucose mineralization in attached bacteria. It is suggested that organic decomposition is carried out mainly by attached bacteria. Data from four other estuaries suggest that when concentrations of suspended solids are lower, free bacteria may be more abundant than attached bacteria. Therefore, in these estuaries, free bacteria may make a relatively greater contribution to the heterotrophic bacteria population.

Citation 165

GRADL, T.

Kiel Univ. (West Germany), Institut fuer Meereskude

Enzymatic in situ Measurements: New Seawater and Sediment Measurement Methods

Kiel Meeresforsch

1974,30(1),1-11.

German

A percolator was constructed to continuously measure metabolic processes in sediments. A continuous flow of water penetrates the sediment. O2 can be excluded. Continuous polarographic control or control with enzyme electrodes is possible. Gases evolved by metabolism can be trapped. An attempt to discriminate bacterial and purely enzymatic processes (free enzymes) by addition of chloroform or toluence (both lethal for bacteria) was unsuccessful. Enzyme electrodes were constructed as a probe for sediments, for the percolator and for the free water. The enzyme elctrodes permit the determination of the ratios of Pi/organic P, urea/ammonia, and glycosidically bound glucose/free glucose. The enzyme is coupled to a diazotized anilin resin fixed on a metal electrode as a thin layer. The potentials (measured against Ag-AgCl) correlate with the ratio of the concentrations of substrate and product. Absolute measurements can be performed. The electrodes are calibrated in Tris-HCl-buffer solutions of pH S. To study the fine structure of sediments, matrix bound color reactions are used. The matrices are fixed to glass slides. Glucose is bound glycosidically to an epoxy resin. After exposition the remaining glucose is measured by a color reaction. Dehydrogenases are detected by 2,3,5-triphenyltetrazolimchloride fixed to a matrix by spraying with a teflon aerosol. The yellow formazan color is measure. H2S is detected by lead acetate which is enclosed in the cells of a dried emulsion. The walls are permeable for gas (H2S), but not for the insoluble reaction product. All reactions are calibrated in Tris-HCl-buffer solutions of pH 8.

Citation 166

GRAEF, W.

Myxobacteria of the Myxococcus Group as Indirect Indicators of Fecal Matter in Surface Water: 1. Communication

Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med.

1975,160(1),28-39.

German

The fruiting-body-forming myxobacteria of the Myxococcus group are coprophilic, ie, they accumulate in biotopes containing fecal substances. A detection method of Myxococcus in water, based on the membrane-filter method, was developed. Field studies in the region of a mechanico-biological clarifying plant, above a stretch of the Regnitz River laden with wastewater, and on the Bodensee (Lake Constance) (West Germany) revealed a clear correlation between the load of fecal substances in such waters and their content of myxococci. These germs can be used as indirect bacterial indicators of fecal substances.

Citation 167

GRAY, J. S.

Leeds Univ. (England), Wellcome Marine Lab

The Fauna of the Polluted River Tees Estuary

Estuarine Coast Mar Sci

1976,4,653-676.

English

The fauna at the mouth of the grossly polluted river Tees estuary, England, was surveyed in summer 1971 and spring 1973. Gastrotrichs and nematodes dominated numerically and were more abundant within the estuary than at open coast beaches, (2 x 10 to the 6th power compared with 8 x . 000001 animals sq m). Few environmental factors correlated with faunal abundance. Sewage bacteria showed a positive correlation with gastrotrichs at open coast beaches and a negative correlation at sheltered beaches, whereas nematodes showed a positive correlation with sewage bacteria at a sheltered sand beach and a negative correlation at a muddy beach. Annelids did not show correlations with granulometric factors and comprised 98% of the biomass of the muddy area. Using data on annelid species, diversity patterns and a variety of multivariate analyses all showed that at the muddy Seal Sand, a central area could be distinguished from a peripheral area. The central area was physically stable and was covered by an algal mat. This area contained the polychaetes Capitella capitata, Polydora ciliata, Streblospio shrubsolii and Manayunkia aestuarina and the oligochaetes Peloscolex benendeni and Tubifex pseudogaster. The macrofauna comprised fewer species when compared with a survey done in 1935; in particular there were fewer species of pelecypods. There were no detectable effects of pollution on the meiofauna; the numbers of organisms and total biomass were comparable with those of other temperate estuaries.

Citation 168

GREEN, KATHERINE A.

P. O. Box 13204, El Paso, TX 79912

A Conceptual Ecological Model for Chesapeake Bay

US Dept of Interior, Fish and Wildlife Service, Aquatic Ecosystem Group

1977, Order No. SFWB 144807,36p.

English

A conceptual model for the Chesapeake Bay ecosystem (wetlands, tributaries, and bay proper) has been developed as an interrelated series of box and arrow diagrams showing carbon and nutrient pathways. Information was based on discussions with Bay scientists. The ecological functions which produce the resources of commercial and recreational fisheries, habitat for migratory birds and other wildlife, waste disposal, and aesthetic water quality are indicated. Physical (light, turbidity, mixing, transport, sedimentation) and chemical (sediment-water interactions, presence of pollutants) aspects of the environment modify the rates of biological processes (primary production, nutrient regeneration, larval survival). (abbrev.)

Citation 169

GRENNEY, W. J. , D. A. BELLA, H. C. CURL

Utah Water Research Lab. , Logan

Effects of Intracellular Nutrient Pools on Growth Dynamics of Phytoplankton

J Water Pollut Control Fed

1974(July),46(7),1751-1760.

English

A three-compartment mathematical model has been developed to represent a phytoplankton population having the capacity to store nitrogen in a nitrate-limited environment. Parameters were estimated by fitting the model to equilibrium data from two chemostat experiments. The model then was run to simulate the transient chemostat conditions and the model response was compared with the observed data. The model is shown to provide a reasonable representation of the sudden population surges associated with intracellular nutrient storage.

Citation 170

GRENNEY, WILLIAM J. , DAVID A. BELLA

Department of Civil Engineering, Oregon State University, Corvallis, OR 97331

Field Study and Mathematical Model of the Slack-Water Buildup of a Pollutant in a Tidal River

Limnol Oceanogr

1972,17(2),229-236.

English

The accumulation of a pollutant in the vicinity of an outfall during slack-water periods in a tidal river was studied through a field investigation and a mathematical model. A diffuser was installed across the main channel of the Yaquina River about 35 km from the mouth at Newport, Oregon. Rhodamine-B was injected at a constant rate for 10 hr and over 400 water samples were taken. The data indicate a significant buildup during periods of slack water. A one-dimensional, time dependent, finite-difference model developed for the field study simulated average trends reasonably well, but calculated peak values were consistently lower than field observations. Concentration profiles from the model were sensitive to the dispersion coefficient and the grid parameters when large concentration gradients were present.

Citation 171

GROSS, F.

Department of Zoology, University of Edinburgh

Further Observations on Fish Growth in a Fertilized Sea Loch (Loch Craiglin)

J Mar Biol Assoc UK

1949,28,1-8.

English

Flounders grew much more slowly in 1944 than during the previous 2 years. From October 1943 to October 1944 their mean size increased from 7.9 cm, 6.8 g, to 12.7 cm, 23.6 g, an increment which was if anything smaller than under normal conditions. The reason of the reduction in growth rate is attributed to the increasingly unfavourable hydrographic conditions resulting from the prolonged closure of the dam, in particular to the high H2S concentration, the high pH and the low oxygen concentration of the water. In the autumn of 1944 the sluice gate of the dam was opened for several months. In 1945/46 the growth of stock III flounders was very rapid. They reached a mean size of 32.3 cm, 409 g, in March 1946 and 36.8 cm, 580 g, in March/April 1947. Native flounders reached a mean size of 30.6 cm, 353 g, in 2 years. The poor growth in 1944 was reflected in narrow bands laid on by the otoliths and in low condition factors (1.05-1.15), the subsequent great improvement in growth rate was correlated with broad rings and high condition factors (1.31-1.16 in stock III, 1.2-1.23 in the native stock). In March 1946 most females and all males were ripe at an age of 3 years. In March/April 1947 10 males were fully ripe at 2 years of age. These observations, in conjunction with those recorded by Kandler (1932), suggest that sexual maturity is correlated with size and not with age.

Citation 172

GRUNSFICH, GARY S. , IVER W. DUEDALL

Marine Sciences Research Center, State University of New York,
Stony Brook, NY 11794

The Decomposition of Sewage Sludge in Seawater

Water Res

1978,12,535-545.

English

Laboratory experiments were conducted over a 12 week period to follow the decomposition of sewage sludge in seawater and sediment-seawater mixtures under aerobic and anaerobic conditions at 4 and 21 C. Results showed that the sewage sludge decomposed more rapidly in the presence of oxygen. Dissolved organic carbon, a major carbon source in sewage sludge, abruptly decreased to very low concentrations in 3-4 weeks in aerobic systems; concentrations of particulate carbon decreased only gradually during the 12 week period. Aerobic conditions at the sewage sludge dump site in the New York Bight apex can promote rapid decomposition of sewage sludge if it is distributed evenly over an area of at least 5.2 km2 (2 miles2).

Citation 173

GUIDE, VICTOR , ORTERIO VILLA, JR.

US Environmental Protection Agency, Annapolis Field Office, Annapolis, MD

Chesapeake Bay Nutrient Input Study

US EPA, Annapolis Field Office

1972(Sept), Technical Rep. No. 47,118p.

English

The purpose of this study was to determine primary stream and watershed sources and their relative contributions seasonally of nutrients to the Chesapeake Bay. Nutrient loading and stream flow are statistically related through regression analysis. Discussion of seasonality of nutrient loading is based on mean monthly flow, substantiated by linear regression extrapolation of this data. During the study, the majority of nutrients entered the Bay from November to May; the primary sources of nutrients were the Susquehanna, Potomac, and James watersheds. The Susquehanna contributed over 50% of all nutrients to the Bay. 13 references. Abstr. by JMB.

Citation 174

HAAS, LEONARD WILLIAM

The School of Marine Science, The College of William and Mary in Virginia

Plankton Dynamics in a Temperate Estuary with Observations on a Variable Hydrographic Condition

VIMS

1975, PhD Dissertation.

English

A station in the York River mouth (37o14'40" N. lat. , 76o23'28" W. long. , depth ca. 18 meters) was occupied eight times (24-36 hours duration) during 1974 for the purpose of elucidating 1. the hydrographic characteristics, and 2. the dynamics of the phytoplankton community of this temperate estuarine system. Emphasis in the phytoplankton study centered on defining the role of the nannoplankton (<15um) and the short term (hourly) variation in plankton parameters. Temperature, salinity, dissolved oxygen, light penetration, chlorophyll a (Chl a), and in situ primary production (PP) were measured at intervals through the water column periodically for the duration of each station. (abbrev.)

Citation 175

HAERTEL, LOIS , CHARLES OSTERBERG , HERBERT CURL JR. , P. KILHO PARK

Dept. of Oceanography, Oregon State University, Corvallis, OR 97331

Nutrient and Plankton Ecology of the Columbia River Estuary

Ecology

1969,50(6),962-978.

English

Monthly samples of nutrients, phytoplankton and zooplankton were taken in the Columbia River estuary over a period of 16 months in order to determine distribution with season and salinity, and interrelationships between plankton and nutrients. Nitrate and phosphate levels in the river water entering the estuary are high in the winter and show depletion during the summer. Silicate levels are high in the river water at all seasons. During the summer upwelling season nitrate and phosphate levels in the entering ocean water are high. Although nutrient levels in the estuary generally show a linear relationship with salinity, nutrients tend to be enriched in the bottom waters of the central part of the estuary. The estuarine phytoplankton is primarily composed of freshwater species, and probably represents a downstream extension of the river flora. Linear regression analysis indicates a strong correlation between phytoplankton abundance and solar radiation. The estuary zooplankton is composed of fresh water, oligohaline and polyhaline forms. Eurytemora affinis, an oligohaline form is the major zooplankter, reaching population densities of 100,000/m3 or more. Regression analysis indicates a strong correlation between abundance of fresh water zooplankton and river temperature. Regression analysis indicates close correlation between phosphate levels and Eurytemora abundance. This indicates a strong potential for zooplankton regeneration of phosphate necessary for phytoplankton growth.

Citation 176

HAINES, E. B.

Georgia Univ. , Sapelo Island, Marine Inst. ,

Nitrogen Content and Acidity of Rain on the Georgia Coast

Water Resour Bull

1976(Dec),12(6),1223-1231.

English

Since nitrogen is a nutrient frequently in short supply in coastal ecosystems, an estimate of the nitrogen input via rain was made for the Georgia coast. Water samples collected in 34 separate storms during a 12 month period were analyzed for concentrations of ammonia, nitrate plus nitrite, and dissolved organic nitrogen (DON). The range and average concentration in micromoles of nitrogen per liter were 0.0 to 137 (6.3) for ammonia, 1.0 to 21 (7.9) for nitrate plus nitrite, and 0.0 to 13.6 (4.0) for DON. DON, not usually measured in rain, comprised up to 62% of the total nitrogen content. The annual amount of nitrogen contributed by rain to the coast was about 0.3 g N/sq m. This value is a small fraction of the calculated nitrogen requirements of coastal plants. More than half the rain samples had pH values less than the CO2 equilibrium pH of 5.6. Values as low as 4.2 were in the range of pH values reported for acid rain in Europe and the northeastern U. S. Total titratable acidity was measured for 12 summer rainwater samples. The results for 7 individual storms showed a highly linear relation between hydrogen ion concentration and total acidity. However, the slope of the regression line indicated that increases in acidity were not a result of addition of strong acid alone.

Citation 177

HAINES, EVELYN B.

University of Georgia Marine Institute, Sapelo Island, GA 31327

Nitrogen Pools in Georgia Coastal Waters

Estuaries

1979(Mar),2(1),34-39.

English

The amount of nitrogen present as ammonia, nitrate, nitrite, dissolved organic nitrogen, and particulate nitrogen was determined for nearshore Georgia shelf waters and for tidal water inundating a 0.5 hectare diked Spartina alterniflora salt marsh in the adjacent estuary. Concentrations of ammonia, nitrate, and nitrite were comparatively low in offshore water (<2.2 ug-at N/l), and in high tide water in marsh (<9.9 ug-at N/l). High concentrations of ammonia, up to 73.4 ug-at N/l, were measured in low tide water draining from marsh. The largest pools of nitrogen in offshore water and in high tide water in the marsh creek were dissolved organic nitrogen (DON) (2.5 to 20.4 ug-at N/l) and particulate nitrogen (PN) (0.1 to 30.0 ug-at N/l). Concentrations in marsh creek water at low tide were higher, ranging from 4.4 to 38.0 ug-at N/l for DON and from 13.0 to 239.0 ug-at N/l for PN. Comparisons of the average concentrations of dissolved and particulate forms of nitrogen in the marsh tidal creek during flood and during ebb tide suggested no net movement of the inorganic nitrogen nutrients, a net influx of PN to the marsh, and a net outflux of DON from the marsh.

Citation 178

HALE, STEPHEN S.

Graduate School of Oceanography, University of Rhode Island, Kingston, RI

The Role of Benthic Communities in the Nitrogen and Phosphorus Cycles of an Estuary

Proceedings of a Symposium "Mineral Cycling in the Southeastern Ecosystems"

1975, Cof-740513,291-308.

English

A study of net sediment-water fluxes of ammonia, nitrate, nitrite, and inorganic phosphate was conducted in Narragansett Bay, RI , from July 1973 to January 1974 to examine the role of benthic communities in the nutrient cycles of this estuary. Bottom chambers were used to obtain in situ measurements from an Ampelisca abdita (amphipod) community, a Nepthys incisa--Nucula annulata (polychaete--bivalve) community, and a Mercenaria mercenaria (bivalve) community. Oxygen uptake was used as a measure of metabolism. Over a temperature range from 3.2 to 22.4 C, ammonia flux at the sediment surface varied from -4.28 to 276.10 umoles m-2 hr-1. Nitrate was transported in both directions across the sediment-water interface, varying from -66.31 to 43.43 umoles m-2 hr-1. Nitrite flux was relatively unimportant. Phosphate uptake and release ranged from -9.43 to 41.63 umoles m-2 hr-1. Few significant differences ($p<0.05$) were found among the three communities. Temperature exerted a strong influence on the fluxes of ammonia and phosphate. The fluxes measured can have significant effects on the nutrient concentrations of the overlying water.

Citation 179

HALLBERG, R. D. , L. E. BAGANDER, A. G. ENGVALL, M. LINDSTRON, S. ODEN, F. A. SCHIPPEL

ASKO Laboratory, University of Stockholm, Sweden

The Chemical-Microbiological Dynamics of the Sediment-Water Interface

Univ. of Stockholm, Sweden

1973, Contribution No. 2.

English

In order to perform geochemical microbiological model studies at the sediment-water interface a certain volume of bottom water and underlying sediment is enclosed by means of a plexiglass vessel. By this means it is possible to control and register chemical and microbiological changes in an isolated natural system. Sampling from the water body and sediment enclosed by the vessel is carried out by SCUBA-diving. (Thus the method is limited to a water depth of about 40 m). The changes in the chemistry of the bottom water, as a result of changes in the chemical nature of sediments due to the production of hydrogen sulphide has been studied during the last 3 years by means of this in situ method.

Citation 180

HAMPSON, B. L.

Ministry of Agriculture Fisheries and Food, (Lowestoft England) Fisheries Lab

The Analysis of Ammonia in Polluted Sea Water

Water Res

1977,11(3),305-308.

English

Measurement of ammonia in polluted seawater or freshwater is important, especially in fish rearing. However, existing methods for the determination of ammonia are subject to serious suppression interference by many substances, including all types of amines, nitrite, and amino acids, which may participate in the chain of reactions employed diverting it. Some methods suffer from breakdown of amino acids to ammonia. Hydrogen sulphide, often present in anoxic waters, also interferes and must be removed. The reported method overcomes the mentioned difficulties by internal standard calibration and by specific u. v. photo-activation of the required ammonia yields indophenol blue reaction at low temperature.

Citation 181

HANNAH, R. P. , A. T. SIMMONS, G. A. MOSHIRI

General Electric Co. , Mississippi Test Facilities, Bay St. Louis, MS

Nutrient-Productivity Relationships in a Bayou Estuary

J Water Pollut Control Fed

1973 (Dec),45 (12),2508.

English

The temporal and spatial distribution of N2 and P were studied in Bayou Texar, an estuarine bayou near Pensacola, Fla. , as related to the major nutrient source and carbon fixation of the system. Results showed that Carpenter's Creek was the primary source of all N2 forms except nitrite. There was a significant degree of P exchange between the water and bayou sediments, even though the P content of the bayou was very low. Carbon fixation rates ranged from 140 mg C/hr/cu m in the early fall to 10 mg C/hr/cu m in the winter. Finally, the tests indicated that the inorganic nitrates were more important than the inorganic phosphates in controlling carbon fixation rates.

Citation 182

HANSON, R. B. , K. R. GUNDERSEN

University of Hawaii, Department of Microbiology, Honolulu, HA 96822

Bacterial Nitrogen Fixation in a Polluted Coral Reef Flat Ecosystem, Kaneohe Bay, Oahu, Hawaiian Islands

Pac Sci

1976,30(4),385-393.

English

Benthic nitrogen fixation was investigated in Kaneohe Bay, Oahu, Hawaiian Islands, which receives secondary sewage from two treatment plants. The range of nitrogen fixation rates (2 to 10 ng N2g-1hr-1) was similar to those reported by other workers for a variety of benthic systems. Enrichment cultures prepared from sediment samples from five stations revealed the existence of several distinct physiological types of nitrogen-fixing bacteria. It was found that 50 percent of the bacterial fixation in the southern sector was light-dependent. There was a significant relationship between the numbers of nitrogen-fixing bacteria detected and rates of nitrogen fixation measured in the sediments.

Citation 183

HARLEMAN, D. R. F. ; J. E. DAILEY, M. LU. THATCHER, T. O. NAJARIAN, D. N. BROCARD

Massachusetts Inst. of Tech. , Cambridge, MA, Dept. of Civil Engineering.

User's Manual for the M. I. T. Transient Water Quality Network Model - Including Nitrogen-Cycle Dynamics for Rivers and Estuaries

MIT

1977(Jan), EPA/600/3-77/010,263p.

English

This study presented the development of a water quality engineering model for nitrogen-limited, aerobic estuarine systems. The uniqueness of the model lies in its application of real-time hydrodynamics, that is the proper specification of mass transport due to changes in magnitude and direction of flow with time in tidal systems. The model is intended to be used in engineering decisions regarding the degree of eutrophication due to distributed and point source loadings in estuaries. This user's manual contains a review of the theoretical background for the one-dimensional, real-time, nitrogen cycle model, a detailed discussion of the computer program including a complete listing of the program, and an example of the application of the model to hypothetical estuarine and river systems.

Citation 184

HARRIS, RICHARD L.

Dept. of Chemistry, Univ. of MD

Processes Affecting the Vertical Distribution of Trace Components in the Chesapeake Bay

Univ. of MD

1976, PhD Dissertation.

English

Seasonal changes in phosphate and 8 trace metals (Cd, Cr, Cu, Fe, Mn, Ni, Pb, Zn) have been investigated over a one year period at a station near the deepest point in the Chesapeake Bay. For the monthly sampling, in situ temperature, salinity, depth, pH, and dissolved oxygen were measured; chlorinity, total alkalinity, sulfide, sulfate, total and soluble orthophosphate, ammonia, and chlorophyll a were measured in the laboratory. Noticeable changes in the mid-Bay waters have occurred since 1938. Total phosphates (40 ug/l) and chlorophyll a (25 ug/l) are now almost double their average summer concentrations of over 35 years ago. Dissolved oxygen has increased from 7.5 mg/l to 9 mg/l. These long term changes show the influence of increased biological activity in this region of the Bay. In addition, the deep water anoxic zone remains longer now in the summer than in the early 1950's. For the first time the vertical distributions of several components are documented at one site in the Chesapeake Bay. The trend for one month bears little resemblance to preceeding and following months. This implies the existence of active vertical transport processes capable of changing surface and bottom water compositions within the time span of one month, the calculated residence time for the trough waters. Several possible mechanisms for accomplishing this vertical transport are critically examined. (abbrev.)

Citation 185

HARRISON, WILLIAM G. , JOHN E. HOBBIE

North Carolina Water Resources Research Inst. , Raleigh, NC

Nitrogen Budget of a North Carolina Estuary

WRRI North Carolina

1974(Jan), UNC-WRRI-74-86,187p.

English

The Pamlico River Estuary of eastern North Carolina is a relatively oligotrophic ecosystem which is entering the initial stages of cultural eutrophication. The estuary is naturally rich in phosphorus and indirect evidence indicates that nitrogen probably limits primary production. Investigations into the various pathways of nitrogen movement and transformation were needed to determine the importance of nitrogen in controlling production in the estuary. In order to answer these questions, a study of the nitrogen cycle of the estuary was undertaken.

Citation 186

HARRISON, WILLIAM GLENN

Raleigh, Dept. of Zoology, NC State University

Nitrogen Budget of a North Carolina Estuary

UNC State University

1974, Doctoral Thesis, 188p.

English

Nitrogen concentrations in the Pamlico River estuary changed seasonally with highs occurring in winter and early spring and lows occurring in summer. Of the five forms of nitrogen measured (nitrite, nitrate, ammonium, dissolved organic and particulate nitrogen), the dissolved organic fraction was the largest. Concentrations of total inorganic nitrogen varied over distance and over time, basically reflecting nitrate fluctuations. Seasonal peaks in nitrite and nitrate concentrations occurred in winter with concentrations at barely detectable levels in summer. Ammonium was present in relatively high concentrations year round and was distributed uniformly throughout the estuary. Dissolved organic nitrogen concentrations were at least equivalent to inorganic nitrogen concentrations most of the year. Biological uptake and release were the most important pathways of nitrogen transformation. The calculated annual inorganic nitrogen budget for the estuary revealed that of the total inorganic nitrogen entering the system, nearly 40% disappeared. At present, nitrogen appears to be a major factor limiting the production of the estuary although the amounts entering have caused no noticeable ill effects.

Citation 187

HARTWIG, E. O.

Johns Hopkins Univ. , Baltimore, MD. Chesapeake Bay Inst.

The Impact of Nitrogen and Phosphorus Release from a Siliceous Sediment on the Overlying Water

Third International Estuarine Conference, Galveston, TX

1975(Oct), Paper No. C00-3279-20,33p.

English

The nutrient exchange rate was quantified for subtidal siliceous sediments at a depth of 18.3 m in the La Jolla Bight, and the probable impact of this exchange on phytoplankton productivity in the overlying water was analyzed. Release (+) or uptake (-) of nutrients was measured by analyzing nutrient concentrations contained in a known water volume overlying a measured sediment area enclosed within plastic boxes over a predetermined time interval. Mean net exchange values and total range of rates were (in micromoles/sqm/day); ammonia +872 (-47 to +3290); nitrite +34 (-5 to +97); nitrate -77 (-720 to +647); phosphate +77 (-438 to +502); dissolved organic phosphorus +12 (-28 to +59); dissolved organic nitrogen -75 (-1326 to +1280); and dissolved organic carbon -583 (-30,800 to +23,800). Using published primary production rates and carbon- nitrogen-phosphorus ratios it is calculated that 15,000 micromoles N/sqm /day and 935 micromoles P/sqm/day were taken up by the phytoplankton. The benthos released 786 micromoles N/sqm/day and 90 micromoles P/sqm/day, or 5% and 10% of the required nitrogen and phosphorus. Results showed, however, that sediment exchange released only an insignificant fraction of both nitrogen (0.04%) and phosphorus (0.05%) already contained in the water. Using a mean net advection rate of 1.5 km/day, it is presumed that nitrogen and phosphorus released into the water was superfluous to the needs of the phytoplankton and was therefore exported from the area.

Citation 188

HARVEY, WAYNE A. , JOHN CAPERON

University of Hawaii, Department of Oceanography, Honolulu, HA 96822

The Rate of Utilization of Urea, Ammonium, and Nitrate by Natural Populations of Marine Phytoplankton in a Eutrophic Environment

Pac Sci

1976,30(4),329-340.

English

The utilization rates of ammonium, nitrate ion, and urea were determined for 18 samples of water from the southern sector of Kaneohe Bay, Oahu, Hawaiian Island. The samples were collected from 14 May through 23 August 1974. The mean daytime uptake rates for this period were 0.040,0.033, and 0.013 hr-1 for ammonium, urea, and nitrate, respectively. Dark uptake rates for ammonium, urea, and nitrate from two samples were approximately 50,30, and 0 percent of the daytime uptake rates. The uptake data indicate that the phytoplankton growth rate is not limited by the availability of fixed nitrogen. This conclusion is supported by the data on the carbon/nitrogen ratio of the phytoplankton, which show that the plants were more heavily enriched in nitrogen than they had been during previous studies of this part of the bay. Mass balance calculations show that the supply of fixed nitrogen to the nutrient pool from stream runoff and municipal waste discharge was only 3.5 percent of the total uptake rate by phytoplankton, and, therefore, suggest that the in situ regeneration of nutrients is far larger than the new nutrients added to the bay from these sources.

Citation 189

HATCHER, P. G. , L. E. KEISTER, P. A. MCGILLIVARY

National Oceanic and Atmospheric Administration, Miami, FL, Atlantic Oceanographic and Meteorological Labs

Steroids as Sewage Specific Indicators in New York Bight

Sediments

Bull Environ Contam Toxicol

1977(Apr),17(4),491-498.

English

Steroids associated with human fecal matter were suggested as sewage pollution indicators in marine sediments. Some of these, such as coprostanol, have not been detected in unpolluted marine sediments and would be useful as indicators. An analysis of the New York Bight sediment was conducted to evaluate this theory. Steroids were determined in freeze-dried sediments and in sewage samples, one taken from a near-shore site and the other from a sewage sludge dumpsite, were coprostanol, cholestrol, beta-sitosterol, and 24 beta-ethyl coprostanol. Of these, cholesterol and beta-sitosterol were present in significant quantities. These steroids are usually dominant in marine sediments, coprostanol and 24 beta-ethyl coprostanol in the bight sediment linked the major organic component of the muds to sewage. Coprostanol concentrations in the two sediments were 4.8 and 5.2 ppm, which indicated a similar level of sewage contamination. Thus the nearshore sample indicated as much contamination as the sample from a basin heavily impacted by sewage. Analysis of a New York City treatment plant's sludge revealed large amounts of coprostanol and 24 beta-ethyl coprostanol. This confirmed the results of the sediment analysis. It was concluded that coprostanol or 24 beta-ethyl Coprostanol could be used to identify sediment sewage contamination on a horizontal or vertical sedimentary profile.

Citation 190

HATTORI, A. , I. KOIKE

Univ. of Tokyo, Ocean Research Inst. , 15-1,1-chome, Minamidai, Tokyo, 164 Japan

Denitrification and Ammonia Formation in Anaerobic Coastal Sediments

Appl Environ Microbiol

1978(Feb),35(2),278-282.

English

Simultaneous determinations of N2 production, ammonia, and particulate organic N formation in the coastal sediments of

Mangoku-Ura, Simoda Bay, and Tokyo Bay, Japan, were made by using the 15N-label tracer method. The rate of N2 production in the sediment surface layer was 10-2 ug atom of N/g/hr, irrespective of the location of the sediments examined. The (15N)ammonia and particulate organic N accounted for 20-70% of the 3 products, and after several hours of incubation, the major fraction of nondenitrified 15N in Mangoku-Ura and Simoda Bay sediments was recovered as ammonia. In Tokyo Bay sediments, particulate organic N was produced at a greater rate than was ammonia. The reduction rate data suggest that the pathway of nitrate reduction to ammonia is important in coastal sediments.

Citation 191

HECK, K. L. , JR.

Department of Biological Science, Florida State University; Tallahassee, FL

Community Structure and the Effects of Pollution in Sea-Grass Meadows and Adjacent Habitats

Mar Biol

1976,35,345-357.

English

Differences in the structure of epibenthic invertebrate species assemblages were investigated in two estuarine areas in Apalachee Bay, Florida (USA), and related to the presence or absence of pulp-mill effluents. Invertebrate species associated with sea-grass beds, mud flats, and oyster reefs were included in the analyses. Surprisingly, several commonly used indicators of pollution stress were ineffective in differentiating the study areas, even though there were large differences in abundance and dominance relationships between them, and these differences were clearly related to the presence of the pulp- mill effluents. Recommendations for data analyses in similar types of studies are made, based on the results of this investigation and others in the same study areas.

Citation 192

HEINLE, D. R. , D. A. FLEMER , J. F. USTACH , R. A. MURTAGH

Maryland University, Prince Frederick, Center for Environmental and Estuarine Studies, MD

Contributions of Tidal Wetlands to Estuarine Food Chains

Water Resources Research Inst. Maryland

1975, Technical Rep. No. 29,34p.

English

Flows of detritus and nutrients from stable marshes in the upper Patuxent Estuary subjected to low tidal amplitude were slight. The quantity of particulate carbon flowing from the marsh to the estuary was less than 10% of annual production. By contrast, a portion of the marshes subjected to scouring by ice lost virtually all of its above ground biomass to the estuary and contributed over half of the annual carbon budget to the system. An appendix entitled 'Problems with adenosine triphosphate measurements in the Patuxent River marshes' concluded that this technique is a poor biomass indicator for the marshes.

Citation 193

HEINLE, D. R. , D. A. FLEMER

Univ. of Maryland, Center for Environmental and Estuarine Studies Chesapeake Biological Lab. ; Solomons, MD

Flows of Material between Poorly Flooded Tidal Marshes and an Estuary

Mar Biol

1976,35,359-373.

English

Flows of particulate carbon, nitrogen, phosphorus, chlorophyll a, crude fiber, carbohydrate, and adenosine tri - phosphate; and of dissolved nitrogen and phosphorus between a marsh and the Patuxent Estuary, Maryland, USA, were measured over a two year period. Virtually no carbon was exchanged, while net flows of nitrogen and phosphorus were from the marsh to the estuary, principally in dissolved forms.

Citation 194

HEINLE, DONALD R. , DAVID A. FLEMER, ROGERS T. HUFF, SHELLY T. SULKIN, ROBERT E. ULANOWICZ

University of Maryland, Center for Environmental and Estuarine Studies, Chesapeake Biological Laboratory, Solomons, MD 20688

Effects of Perturbations on Estuarine Microcosms

Univ. of South Carolina, Belle W. Baruch Inst. for Marine Biology and Coastal Research

Rec'd (Nov)1978, in Press.

English

Microcosms containing planktonic communities from Chesapeake Bay responded to enrichment by sewage by developing larger standing crops of phytoplankton and zooplankton. Data suggest that increased productivity would be reflected up the food chain, but might increase existing problems with dissolved oxygen and lead to qualitative changes in the composition of the zooplankton. Either phosphorus or nitrogen were removed more rapidly from solution depending on where and when the experimental water was obtained. Increases in standing crop of algae were associated loss of nitrogen from solution in two experiments and losses of both nitrogen and phosphorus from solution in one experiment.

Citation 195

HEINLE, DONALD R. , DAVID A. FLEMER , JOSEPH F. USTACH, RICHARD A. MURTAGH, ROGER P. HARRIS

Maryland Univ. , Solomons. Natural Resources Inst.

The Role of Organic Debris and Associated Micro-Organisms in Pelagic Estuarine Food Chains

NRI Maryland

1973, Rep. No. NRI-Ref-74-29 TR-22,130p.

English

Production on marshes adjacent to the upper Patuxent estuary was 1,000 to 1,500 grams dry weight per square meters per year. Approximately 6 to 9 percent of the annual production was exported to the estuary as particulate carbon. Production was comparable to other marsh systems but export (as percentage of production) was less, probably due to poor tidal exchange. In spite of the relatively low percentage of their fixed carbon contributed to the estuary, the marshes provide about one-third of the total carbon budget in the upper Patuxent. A large portion of the marsh carbon enters the estuarine system in early spring when levels of algal primary production are low. Substantial production of the calanoid copepod, Eurytemora affinis occurs with detrital carbon as the apparent food base. Feeding experiments indicate that E. affinis can reproduce when fed a diet of detritus enriched with bacteria and protozoa, or when fed only protozoa. Diets of detritus and micro-organisms alone were seldom equal to algal controls.

Citation 196

HELZ, G. R. , R. J. HUGGETT, J. M. HILL

Maryland Univ. , College Park, Dept. of Chemistry

Behavior of Mn, Fe, Cu, Zn, Cd and Pb Discharged from a Wastewater Treatment Plant into an Estuarine Environment

Water Res

1975(July),9(7),631-636.

English

To obtain information on the fate of trace metals discharged to an estuarine environment, analyses were made on water and sediment samples from Back River, Maryland, and on effluent from the large wastewater treatment plant that discharges there. Within 2-3 km of the outfall, the concentration (in micrograms/liter) of all metals decreases as follows: Mn, greater than 120-90; Fe, greater than 570-300; Cu, 53-7; Zn, 280-9; Cd, 3.5-0.5 and Pb, 31-less than 4. Except possibly for Mn and Fe, these decreases are much greater than can be ascribed to simple dilution, so physical, chemical or biological processes must be removing metals to the sediments. Correspondingly, sediment concentrations of Cu, Zn, Cd, and Pb are approximately one order of magnitude higher than normally found in uncontaminated areas. After the initial decrease, concentrations of Mn and Cd in the water begin to rise again, suggesting remobilization from the sediments. Comparison of the estimated annual discharge of 8 trace metals to the Chesapeake Bay from wastewater treatment plants and from rivers suggests that the wastewater input may be within one order of magnitude of the fluvial input for Cr, Cu, Zn, Cd, and Pb. Of the metals studied, Cd presents the greatest potential for serious pollution because its input from wastewater probably exceeds fluvial input, it appears to be readily remobilized from sediments, and it is known to be toxic to many organisms.

Citation 197

HENDEY, N. I.

The Species Diversity Index of Some-in-Shore Diatom Communities and its Use in Assessing the Degree of Pollution on Parts of the North Coast of Cornwall

In: Fourth Symp. on Recent and Fossil Marine Diatoms, Oslo Aug 30-Sept 3,1976, Proceedings. Edited by P. Simsen

1977,354-377.

English

The Species Diversity Index of a community indicates the degree of 'pollution insult' imposed upon the community by the environment. When the indices of six diatom communities collected from the north coast of Cornwall were ranked in a decreasing order, it was found that three of the sites enjoyed values higher than average while the others were lower. The values decreased during the summer (indicating worsening environmental conditions), the time of year when the population of the County rises steeply due to the influx of summer visitors.

Citation 198

HESS, K. W.

Rhode Island Univ. , Kingston, Graduate School of Oceanography

A Three-Dimensional Numerical Model of the Estuary Circulation and Salinity in Narragansett Bay

Estuarine Coast Mar Sci

1976(May),4(3),325-338.

English

Gravitational circulation in an estuary was produced primarily by longitudinal density differences, but other factors, such as local topography, the Coriolis acceleration, and lateral density variations may be equally important. A generalized three-dimensional rigid-lid model of the steady, density-driven flow was formulated, which includes spatial variations in depth, eddy viscosity and diffusivity, and horizontal pressure gradients. An equation of steady salt conservation was also solved, including convection, based on the gravitation circulation and diffusion in the three directions. Some details of the numerical computations were presented and comparisons with observations from Narragansett Bay were evaluated.

Cyclonic circulation predicted by the model was discussed as an example of its capabilities.

Citation 199

HINCHCLIFFE, P. R.

Lancashire and Western Sea Fisheries Joint Committee,
University of Lancaster, Bailrigg, Lancaster LA1 4XY, England

Surf-zone Water Quality in Liverpool Bay

Estuarine Coast Mar Sci

1976,4,427-442.

English

The results of a continuous investigation into seasonal and long term changes in surf zone water quality on the foreshores around Liverpool Bay are reported for the period 1971 to 1974 inclusive. Five sites along the Lancashire coast were sampled at approximately monthly intervals throughout this period. Five supplementary coastal stations in Cumbria, Cheshire and North Wales were sampled for 24 months during 1972-1974 and three estuarine sites in Lancashire were sampled for 21 months during 1971 to 1972. Samples were taken at low water from just below the low water mark. A fairly predictable seasonal pattern was detected in most of the variables measured. During the summer months the salinity and pH were higher and dissolved inorganic nitrogen concentrations very much lower than in winter. Dissolved reactive phosphate was too heavily buffered by the large amounts of suspended matter to show much seasonal variation. The water remained more or less saturated with dissolved oxygen. During the winter months higher levels of coliforms were detected suggesting that die-off rates increased with increasing temperature. The Mersey appeared to exert a strong influence on the salinity and inorganic nitrogen and phosphorus concentrations of Liverpool Bay coastal water. Steep gradients were detected along the Lancashire and North Wales coasts towards the estuary. Only phosphorous and nitrogen showed any significant long-term changes. Phosphate concentration tended on average to increase over the 4-year period at most stations. The average rate of increase along the Lancashire coast was about 17% per annum--very similar to that detected in other European coastal waters. The winter maximum nitrate concentration remained relatively constant during the period 1971 to 1973, but the maximum concentration in 1974 was substantially higher than in the three previous years at most stations. (abbrev.)

Citation 200

HIROTA, JED, JAMES P. SZYPER

University of Hawaii, Department of Oceanography, Honolulu, HA 96822

Standing Stocks of Zooplankton Size-Classes and Trophic Levels in Kaneohe Bay, Oahu, Hawaiian Islands

Pac Sci

1976,30(4),341-361.

English

Data are presented for the estimated standing stocks of nanozooplankton, microzooplankton, and macrozooplankton in the southern sector of Kaneohe Bay. Analyses of variability in the estimates due to sampling errors and spatial-temporal variations and the annual average values are also given. There is evidence that a shift has occurred in the past decade in the size-composition of the macro- and microzooplankton; during this time the total amount of zooplankton particulate nitrogen has remained nearly unchanged. The same dominant species of macro- and microzooplankton still inhabit the bay. We speculate that the historical changes in the zooplankton of southern Kaneohe Bay are the result of selection for nanophytoplankton feeders with rapid rates of metabolic turnover. The size-composition and trophic structure of the southern Kaneohe Bay zooplankton and plantivorous nekton in the ecosystem are compared with available information from the northeastern Pacific Ocean. The major differences between these ecosystems are to be found in the ratio of macrozooplankton/microzooplankton, the predominant trophic level of zooplankton captured by 0.333-mm- mesh nylon nets, and the size of the common epipelagic planktivorous nekton.

Citation 201

HOBBIE, J. E. , B. J. COPELAND, W. G. HARRISON

North Carolina Water Resources Research Institute, Raleigh, NC

Nutrients in the Pamlico River Estuary, NC , 1969--1971. Eutrophication

WRRI North Carolina

1972(Dec), Rep. 79,242p.

English

A study was initiated in 1966 on the Pamlico River Estuary, N. C. , to determine hydrography, phosphorus concentrations in the water and sediment, and phytoplankton speciation and biomass in relation to inputs from the Tar River Basin and phosphorus mining activities. Since it was likely that inorganic nitrogen was the most important single factor controlling eutrophication, the study was expanded in 1969 to include investigation of nitrogen concentrations and their effects. Phosphorus concentrations are high throughout the Pamlico River Estuary, with the main input via the Tar River. Since these concentrations are already high, additions from smaller tributaries and phosphate mining activities are insignificant in the development of a wintertime algal bloom. Total phosphorus concentrations have been steadily increasing in the estuary since the beginning of the study in 1966. Inorganic nitrogen concentrations ranged between low during summer and high all year around, while nitrate was almost zero during summer and high during winter. These concentrations were controlled to some extent by the flow of the Tar River. During times of moderate to high rates of Tar River inflow there are large build-ups of nitrate in the estuary. Other tributary inputs were so small that their total contribution of nitrate to the estuary was insignificant. Dissolved organic nitrogen was the most abundant form of nitrogen, but is not thought to be biologically available. A strong algal bloom occurs in the middle reaches of the estuary each winter and correllates very well with nitrate concentrations. Phytoplankton nitrate reductase activity in the estuary paralleled the development of the winter dinoflagellate bloom. Nitrate was found to be an important source nitrogen for the bloom organisms in spite of the abundance of ammonia.

Citation 202

HOBBIE, JOHN E.

North Carolina Water Resources Research Inst. , Raleigh, NC

Phosphorus Concentrations in the Pamlico River Estuary of North Carolina

WRRI North Carolina

1970(Mar), Rep. No. 33,50p.

English

The Pamlico River is a naturally rich estuary that extends from Washington, North Carolina some 35 miles to enter the west side of Pamlico Sound. It is shallow (average depth 10.5 feet), and has only a six inch lunar tide. The natural levels of phosphorus in the estuary are, for total phosphorus, 1 - 2 ug - at P/l (0.031 - 0.062 mg P/l). As a result of phosphate mining activities, phosphate levels as high as 93 ug-at P/l (2.9 mg P/l) have been measured in the estuary, however, release is intermittant and the high phosphorus water is found as patches that move seaward along the south shore of the estuary. Because this estuary appears to have more than enough phosphorus for normal algal photosynthesis, it is believed that the phosphorus added by the phosphate mining and fertilizer manufacturing operation has little effect on the biology of the river at the present time. Even more serious is a rise in the concentration of phosphorus entering the upper estuary from the Tar River. This added phosphorus has tripled over the past three years. Because this phosphorus appears to come from sewage, it is likely that the nitrogen is also increasing and that eutrophication of the river could take place within 10 - 20 years. (Author)

Citation 203

HOBBIE, JOHN E.

North Carolina Water Resources Research Inst. , Raleigh, NC

Nutrients and Eutrophication in the Pamlico River Estuary, NC 1971-1973

WRRI North Carolina

1974(Aug), Rep. No. UNC-WRRI-74-100,248p.

English

A study was initiated in 1966 to determine hydrography, nutrient concentrations, and phytoplankton speciation and biomass in relation to inputs from the Tar River Basin and from phosphorus mining activities. Results are presented for 1971 - 73.

Citation 204

HOBBIE, JOHN E. , NATHANIEL W. SMITH

Department of Zoology, NC State University

Nutrients in the Neuse River Estuary, North Carolina

Univ. North Carolina

1975(Dec), UNC-SG-75-21,183p.

English

Concentrations of phosphorus are quite high in the Neuse River Estuary. This is likely caused by a combination of 1) sewage and urban runoff and 2) the high rates of fertilization of tobacco. In both the river and the estuary, the concentrations of posphorus were highest during the periods of low flow and vice versa. Nonetheless, there was always more than enough phosphorus present for algal growth and algal blooms. In spite of this abundant nutrient, the algal blooms formed only during the winter and spring months when nitrate was abundant in the middle reaches of the river. Actually nitrate is present and even abundant throughout the year in the Neuse River. However, in the warm months of the year the river flow is relatively small and biological activity is high; the result is that the nitrate is rapidly used in the first few miles of the estuary. Algal blooms do occur at this time of year but are restricted entirely to the upper end of the estuary near New Bern. In the winter and spring, the nitrate is leached from the soil and reaches high concentrations in the river. The large quantities of inflowing water carry the nitrate for 15 or 20 miles into the estuary. Algae are able to use this nitrate and phosphate even when the water temperatures are low. Ammonia, another source of nitrogen for algae, is abundant throughout the year. Moderate amounts enter the estuary and even greater quantities are regenerated from the decay of organic matter. It is not known why the algae do not utilize the ammonia nitrogen to form blooms; one possibility is that the algae that do form blooms need nitrate and are, in addition, able to gain some competitive advantage by their motility. The exact combination of nutrients and salinity must also be aligned with a relatively slow flushing time of the estuary before a bloom of algae will occur. Often the nutrient conditions seem right but the high rates of inflowing water dilute the incipient bloom and even wash it into Pamlico Sound before the algal concentrations build up.

Citation 205

HOCHMAN, E. , D. ZILBERMAN, R. JUST

Tel-Aviv Univ. , (Israel), Dept. of Economics

Internalization in a Stochastic Pollution Model

Water Resour Res

1977(Dec),13(6),877-881.

English

A stochastic model has been developed for internalizing pollution externalities. Pollution occurs or does not, depending on factors related to a stochastic environment and human error. But the probability of pollution can be altered by adopting various technologies. The model is described in detail in terms of industries located within a river basin, wherein the objective function is that of profit maximization. The model is applied to the problem of effluent runoff holding areas, pollution occurs if a rainstorm is severe enough to cause overflow. Standards rather than taxes are used as policy instruments in the model. Results generally indicate that an accurate approximation of stochastic distribution is a necessity. Specific implications for the dairy problem are that present regulations are too lenient. The methodology presented may be of critical importance for examining other problems, such as oil spills and nuclear power plant explosions.

Citation 206

HODSON, R. E. , O. HOLM-HANSEN, F. AZAM

California Univ. , San Diego, La Jolla, Inst. of Marine Resources

Improved Methodology for ATP Determination in Marine Environments

In: Research on the Marine Food Chain, Progress Report for period July 1974-June 1975.

1975, UCSD 10P20-202,871-888.

English

Three procedures; Tris extraction, conventional acid extraction, and charcoal adsorption method, for extraction of ATP from marine sediments were evaluated. It was found that the charcoal column procedure was suitable since it extracts with high efficiency, removes inhibitory substances, and permits

ATP to be concentrated many fold from large volumes of dilute extract.

Citation 207

HOLDREN, G. R. , O. P. BRICKER, G. MATISOFF

Johns Hopkins Univ. , Baltimore, MD, Dept. of Earth and Planetary Sciences

A Model for the Control of Dissolved Manganese in the Interstitial Waters of Chesapeake Bay

Johns Hopkins Univ.

1975, Rep. CONF-750410-8,18p.

English

A model is described which predicts dissolved manganese distribution in the anoxic pore waters of the sediments of Chesapeake Bay, where greater concentrations of the metal have been found than in any other marine or brackish water sediment system. The model was developed from observations on the pore water composition and describes the results of two independent competing reactions. Both reactions are continuous over the whole sediment column, and the final calculated concentrations of dissolved manganese at any particular depth is dictated by the process most limiting the concentration at that depth. The model requires knowledge of the acidity of the pore waters, the distribution of bicarbonate ion with depth in the sediment, the amount of manganese oxide in the surface sediment and the rate of release of manganous ion from those solids. In the model, the diffusion coefficient and sedimentation rates were assumed as constant through space and time, respectively, and it was assumed that steady state has been reached in the system and that with depth in the core manganous ion was in equilibrium with a poorly-crystalline carbonate phase. Agreement is generally good between the model and the field data, suggesting that the processes controlling the distribution of dissolved manganese in the bay sediments are basically understood.

Citation 208

HOLLAND, J. S. , N. J. MACIOLEK, C. H. OPPENHEIMER

Texas Univ. , Port Aransas, Marine Science Inst.

Galveston Bay Benthic Community Structure as an Indicator of Water Quality

Contrib Mar Sci

1973,17,169-188.

English

Various methods of community structure analysis including several species diversity indices, rarefaction curves and a probability of interspecific encounter index were applied to data collected from selected sites in Galveston Bay, Texas. Hydrographic data and sediment analysis were used in interpreting the results of the various methods of investigating community structure. The different methods of analysis used in this study showed very close agreement. Three of the 5 investigation sites in Galveston Bay showed normal estuarine water quality. Two other stations showed evidence of large amounts of stress probably due to water quality. One of the 2 was probably stressed due to natural causes, primarily salinity fluctuations. The other, a channel site near a huge industrial complex, showed intermittent stress possibly due to man-made pollution.

Citation 209

HOWELLS, GWYNETH P.

Nerc, London, Eng.

The Estuary of the Hudson River, USA

Proc R Soc Lond B Biol Sci

1972(Mar),180(1061),521-534.

English

The Hudson River is a major waterway of the eastern seaboard of the U. S. Its 2 major tributaries, the Mohawk and Hudson, combine to form the long narrow estuary of the Lower Hudson. The area is populous and industrially developed, and it is predicted that both domestic and industrial demands for water will increase, as well as the demand for waste disposal and for maintenance of recreational resources. Recent studies of the ecology of the estuary surveying the levels of pollutants in water, and their distribution between water, muds, and the biota, indicate that water quality may need control if problems with maintenance of fisheries, eutrophication, and drinking water quality are to be avoided. Estuaries are areas of great natural variations in environmental conditions and their flora and fauna is selected and restricted in its variety by the need to tolerate and regulate in the variable conditions. The capacity of estuaries to accept pollutants which enhance natural variations is relatively great. The limits of environmental acceptance need to be determined by achieving the best reconciliation between industrial development and the maintenance of amenity.

Citation 210

HULL, R. J.

Rhode Island Univ. , Kingston. Dept. of Plant and Soil Science

The Capacity of Salt Marsh Vegetation to Modify the Quality of Estuarine Waters

Rhode Island Univ.

1976(Sept), Completion Rep. OWRT B-062-RI(I),34p.

English

The ability of tidal marsh vegetation to absorb nutrient and heavy metal ions introduced to the marsh by tidal flood waters was investigated. Water soluble salts of N, P, Cd, and Zn applied to the marsh surface during low tide, and infiltration into the sediment was measured by analyzing water samples taken from wells placed 15,30,60 and 90 cm into the sediment. Ammonium, applied as urea, and phosphate penetrated the marsh sediment readily with most concentrated in the upper 15 to 30 cm. Spartina alterniflora growing on the marsh absorbed approximately 40% of the NH4+ and 20% of the P applied. S. alterniflora and S. patens absorbed NH4+ preferentially from solutions containing 10 to 15% NaCl. S. patens patens absorbed NH4+ at normal rates regardless of the solution oxygen tension Cd and Zn applied to the marsh surface was not detected in sediment water and plant uptake was less than 1% of that applied. Radio Cd and Zn was absorbed from nutrient solution by S. alterniflora and moved via symplast and apoplast throughout the plant. Nutrient sink properties of tidal marshes are confirmed.

Citation 211

HUNDEMANN, AUDREY S.

National Technical Information Service, Springfield, VA

Remote Sensing Applied to Environmental Pollution Detection and

Management (A Bibliography With Abstracts),1964-July 1978

NTIS

1978(Aug), NTIS/PS-78/0789/4ST, 163p.

English

Application of remote sensing methods to air, water, and noise pollution problems is discussed. Topic areas cover characteristics of dispersion and diffusion by which pollutants are transported, eutrophication of lakes, thermal discharges from electric power plants, outfalls from industrial plants, atmospheric aerosols under various meteorological conditions, monitoring of oil spills, and application of remote sensing to estuarian problems. (This updated bibliography contains 156 abstracts, 23 of which are new entries to the previous edition.) _Supersedes NTIS/PS -77/0674, and Updates NTIS/PS-76/0500. _

Citation 212

HYER, P. V. , A. Y. KUO, C. S. FANG, W. J. HARGIS, JR.

Virginia Institute of Marine Science, Gloucester Point, VA 23062

Hydrography and Hydrodynamics of Virginia Estuaries. VIII. Mathematical Model Studies of Water Quality of the York River System

Appl Mar Sci Ocean Eng

1975(Oct), Special Rep. No. 104,168p.

English

Two water quality models were developed, then calibrated and verified using data collected as part of the CSA modeling project. Intensive hydrographic surveys were conducted along the York estuary in the spring and summer of 1973. Hourly determinations of salinity, temperature, and dissolved oxygen were made for at least thirty-two consecutive hours. Tidal currents were measured at twenty-minute intervals. Monthly slack water runs have been conducted since August, 1970. From these data, two water quality models were developed, one real-time model and one tidal-average model. The real time model is based on the mass balance equations for salt, BOD and DO, with the convective velocity including both freshwater discharge and tidal current. Taylor's formulation of dispersion coefficient was extended to include the effect of density inhomogeneity in the saline water. The differential equations were solved numerically by an implicit finite-difference scheme using a Gaussian elimination method. In the tidal-average model, the convective velocity consisted of the non-tidal component only. The tidal current was treated as an effective turbulence, making the dispersion term much larger than that of the real time model. The tidal-average model is intended for investigating long-term variations of salinity intrusion.

Citation 213

ISCHINGER, L. S. , E. B. WELCH, E. E. GELDREICH, L. W. LITTLE, R. F. UNZ, G. F. CRAUN, D. J. REASONER

US Fish & Wildlife Service, CO

Water Pollution

J Water Pollut Control Fed

1976(June),48(6),1318-1321.

English

Literature on water pollution is reviewed. Included are: freshwater macroinvertebrates; eutrophication; microbiology of water; bioassays-procedures and results; microbiology of waste treatment; microbiology-waterborne outbreaks; microbiology-detection, occurrence, and removal of viruses; oxygen sag and stream purification; pollution effects on surface waters and groundwaters; aquatic sediments; marine and estuarine pollution; heavy metals and related trace elements; thermal effects; effects of pollution on freshwater fish; and mixing and transport.

Citation 214

JAWORSKI, N. A.

US Environmental Protection Agency

Comprehensive Analysis of the Upper Estuary of the Potomac River. Basic Problems in Control of Eutrophication

Vsestoronnii Anal. Okruzhayushchei Prir. Sredy, Tr. Sov. - Am. Simp. , 1st, 1974, Gidrometeoizdat Leningrad, USSR Edited by Yu. A Izrael

1975,189-206.

Russian

Evaluation of the actual trophic condition, nutrient availability, and eutrophic retardation and control are discussed in relation to the Potomac River estuary. Abstr. by M. Svaton.

Citation 215

JAWORSKI, N. A. , D. W. LEAR, JR. , O. VILLA, JR.

US Environmental Protection Agency, Annapolis, MD, Chesapeake Technical Support Lab

Nutrient Management in the Potomac Estuary

In: Nutrients and Eutrophication: The Limiting Nutrient Controversy; American Society of Limnology and Oceanography, Allen Press

1972, Spec. Symp. Vol. 1,246-273.

English

Water quality studies were undertaken to define wastewater treatment requirements of upper Potomac estuary since 1965. Studies and concepts used to formulate a nutrient management program are presented. Causes and control needs were studied relative to the changes in nutrient enrichment, including appearance of nuisance blue-green algae. Data from algal composition analysis, annual nutrient cycles and longitudinal profiles, bioassay studies, algal modeling, comparison with a noneutrophic estuary, and review of historical material were used to establish nutrient criteria. Based on a subjective analysis, desired upper limits of chlorophyll a concentrations were determined for establishing degree of eutrophication control required to minimize detrimental effects on water quality and water uses. Although at the present time no specific criteria relative to requirements for wastewater treatment have been established for the mesohaline portion of the estuary, specific nutrient criteria have been developed for the freshwater portion. With a properly designed facility the dissolved oxygen concentration may be enhanced and algal growth reduced. The water quality management program being developed will not only improve the water quality to meet minimum designated standards, but will render it a feasible source of municipal water supply.

Citation 216

JAWORSKI, N. A. , L. J. CLARK , K. D. FEIGNER

US Environmental Protection Agency, Chesapeake Technical Support Lab, Annapolis, MD

A Water Resource-Water Supply Study of the Potomac Estuary

US EPA

1971(Apr), Technical Rep. No. 35,263p.

English

A detailed investigation of the water quality and water resources of the Potomac Estuary was conducted by the Chesapeake Technical Support Laboratory. Included in the study were an evaluation of pollution sources including nutrients, the development of mathematical models to predict effects on water quality, the projection of water supply needs and wastewater loadings, an evaluation as a potential water supply source, the determination of the maximum pound loadings by zone for certain pollutants under different flow conditions, alternative waste treatment plans and cost analysis of wastewater treatment.

Citation 217

JAWORSKI, N. A. , L. J. CLARK, K. D. FEIGNER

US Environmental Protection Agency, Washington, DC, Office of Research and Monitoring

Upper Potomac Estuary Eutrophication Control Requirements

US EPA, Annapolis Field Office

1972(Apr), Technical Rep. No. 53,45p.

English

Identification of the needs, costs, and mechanisms for controlling eutrophication in the Potomac Estuary was made and an attempt at implementing the program has begun. With capital cost for nutrient removal of over $250,000,000, a need exists for continuous efforts to improve eutrophication control, treatment methods, cost estimates, and institutional arrangements. Maintenance of free-flowing continuous exchange of information among the various agencies conducting the removal requirement studies, designing and facilities, and planning the overall management needs is also necessary. These interactions are the basis for successful management planning.

Citation 218

JAWORSKI, N. A. , L. J. HETLING

Federal Water Pollution Control Administration, Annapolis, MD

Relative Contributions of Nutrients to the Potomac River Basin from Various Sources

US EPA

1970(Jan), Technical Rep. No. 31,36p.

English

The upper Potomac Estuary is highly eutrophic. During the summer months, large blooms of nuisance blue-green algae, mainly Microcystis, occur in the fresh-water portion of the upper Estuary. A relationship between high nutrient content and the accelerated eutrophication in the Potomac Estuary has been established. The annual average concentration of phosphorus varied from 0.09 mg/liter in the south branch to 1.9 mg/liter in the Antietem watershed. The annual average concentration of nitrogen varied from 0.3 mg/liter in the south branch to 2.2 mg/liter in Opequon Creek. About 92,700 lbs. /day of total phosphorus entered the Potomac in 1955,87% from wastewater. The average 1966 loading of total nitrogen was about 125,000 lbs. /day, 51% from wastewater. During low flow conditions a significant proportion of the phosphorus entering the surface water from the various sources in the upper basin is retained in the stream channel. At high stream flow, it appears that a large proportion of this phosphorus is 'flushed' out of the stream channel and transported downstream. A comparison of sources of nutrients in the Hudson River basin to those in the Potomac supports the contention that in the Middle Atlantic region the major source of nutrients to the aquatic ecosystem is from wastewater discharges. (KNAPP-USGS)

Citation 219

JAWORSKI, NORBERT A.

Chesapeake Technical Support Laboratory, Middle Atlantic Region, Federal Water Pollution Control Administration, US

Department of the Interior

Nutrients in the Upper Potomac River Basin

Ches Tech Sup Lab

1969(Aug), Technical Rep. No. 15,91p.

English

This report is on the nutrient concentrations and loadings in the upper Potomac River Basin above Washington, DC, and the purpose is: 1. To present data on the nutrient concentrations and loadings. 2. To identify the portions of the basin high in nutrients. 3. To describe the temporal and spatial distributions of the nutrients in the upper basin. 4. To determine relative nutrient concentrations attributed to domestic wastewater, industrial discharges, and land runoff. Water nutrient analyses consisted of PO4, NO3 + NO2, and TKN.

Citation 220

JAWORSKI, NORBERT A.

Chesapeake Technical Support Laboratory, Middle Atlantic Region, Annapolis, MD

Water Quality and Wastewater Loadings Upper Potomac Estuary During 1969

US EPA

1969(Nov), Tech. Report No. 27 , 104p.

English

This report is a compilation of estuarine data previously collected by state and federal agencies and by the wastewater treatment facilities in the Washington metropolitan area. Water quality conditions and wastewater loadings of the Upper Potomac Estuary during 1969 are defined. Indices of water quality are bacteriological, DO, TOC, CO2, nutrients, chlorophyll, and chlorinated hydrocarbon pesticides. Eutrophication was considered a form of pollution. 4 references. Data appendix. Abstr. by JMB.

Citation 221

JAWORSKI, NORBERT A. , DONALD W. LEAR , JOHAN A. AALTO

Chesapeake Technical Support Laboratory, Middle Atlantic Region, Annapolis, MD

A Technical Assessment of Current Water Quality Conditions and Factors Affecting Water Quality in the Upper Potomac Estuary

US EPA

1969(Mar), CTSL Tech. Report No. 5 , 55p.

English

This report includes an assessment of the 1968 water quality conditions and factors affecting water quality in the Upper Potomac Estuary. It includes the sources and effects of the nutrients on the production of massive phytoplankton growths, and an evaluation of all major sources of carbonaceous and nitrogenous BOD including wastewater discharges, benthic background, and phytoplankton growths and their effects on the DO balance. The report "A Research Program for the Potomac River" by Dr. John C. Geyer, et al. served as a guide for these studies. 22 references. Abstr. by JMB

Citation 222

JAWORSKI, NORBERT A. , LEO J. CLARK, KENNETH D. FEIGNER

US Environmental Protection Agency, Annapolis, MD, Annapolis Field Office

Upper Potomac Estuary Eutrophication Control Requirements

US EPA

1972 (Apr), Rep. No. TR-53,46p.

English

Detailed studies by the Chesapeake Technical Support Laboratory (CTSL) of the Federal Water Quality Administration to define the interrelationships among wastewater inflow, freshwater inflow, and water quality in the Potomac Estuary were undertaken in November 1969. These studies had two purposes: (1) to refine the allowable oxygen demanding and nutrient loadings previously established and (2) to determine the feasibility of using the estuary as a municipal water supply source. Presented herein is a summary of numerous reports published by CTSL with major emphasis on the eutrophication control aspects developed in the recent studies.

Citation 223

JAWORSKI, NORBERT A. , ORTERIO VILLA, JR. , LEO J. HETLING

Federal Water Pollution Control Administration, Chesapeake Technical Support Lab, Annapolis, MD

Nutrients in the Potomac River Basin

US EPA

1969(May), Technical Rep. No. 9,40p.

English

The purpose of this study was to determine the sources, temporal spatial distribution, and transport mechanisms of nutrients in the Potomac River Basin. Total Basin nutrient loadings are summarized utilizing data from wastewater and land runoff sampling programs. Changes in concentrations of TKN, NO2+NO3, total P, and chlorophyll are presented as isopleths with respect to location and time. Phosphorus transport is modeled for steady state flow conditions; values for the transport coefficient vary from 0.1 to 0.3. About 38% of phosphorus entering surface waters in the upper Basin was retained in the stream channel. 8 references. Abstr. by JMB.

Citation 224

JEFFRIES, H. P.

Rhode Island Univ. , Kingston, Narragansett Marine Lab

The Atypical Phosphate Cycle of Estuaries in Relation to Benthic Metabolism

Narragansett Marine Laboratory

1962(Aug), Contribution No. 44,58-68.

English

This report describes the phosphate and nitrate cycles of Raritan Bay, NJ which due to a combination of natural and man-made influences, demonstrate aspects of estuarine nutrient dynamics with the clarity of a laboratory experiment. The characteristic summer increase in phosphate content of New England and Middle Atlantic estuaries, coincident with a sharp drop in the NO3/PO4 ratio, can be qualitatively explained with existing information. The phenomenon, obviously of extreme importance in understanding estuarine productivity, is a manifestation of seasonal changes in several rates, both physical and biological. The processes are not peculiar to estuarine systems, but they appear to exert a greater effect, arising from the fundamental properties of the environment, than in the open ocean. Data are not available to assess these rates quantitatively; only their relative importance can be inferred.

Citation 225

JEFFRIES, H. P.

Rhode Island Univ. , Kingston, Graduate School of Oceanography

Chemical Responses by Marine Organisms to Stress, Stress in Hard Clams from a Polluted Estuary

US Environmental Protection Agency

1971(Dec), EPA-R3-72-017,27p.

English

The hard clam, Mercenaria mercenaria, shows a general response to environmental variation. The molar ratio of free taurine to glycine in gill and mantle tissues climbs above 3, while alpha-amino acids and carbohydrates decrease. Subtle adjustments in the total pattern of free amino acids and fatty acids also occur, but these can be readily seen by changes in biochemical diversity and equitability. In an estuary long suffering from hydrocarbons and other agents in petroleum products and sewage, high mortality results from a culmination of natural responses superimposed on abnormal complications. The process apparently starts after a black, polymeric irritant collects in epithelial tissue and eventually occludes the renal sac. This leads, indirectly, to infestations of a parasitic polychaete that is rarely found in hard clams. A syndrome with many facets soon becomes clear, but the situation can be identified and its results predicted by simply observing the responses of taurine and glycine in stressed and normal populations.

Citation 226

JEFFRIES, HARRY P.

Narragansett Marine Laboratory, University of Rhode Island, Kingston, RI

Environmental Characteristics of Raritan Bay, A Polluted Estuary

Limnol Oceanogr

1962,7(1),21-31.

English

Temperature, salinity, dissolved O2, PO4-P, and NO3-N in Raritan Bay, NJ were determined over a 16-month period. Each reflects the circulation pattern in which sea water floods along the northern shore, enters a region of mixing with river discharge in the head of the bay, and then ebbs out along the southern shore. At the mouth of the bay, salinity was higher on the northern than on the southern side. The mean annual monthly difference at the surface was 1.27o/oo; departures from the mean were related to river flow. Surface and bottom dissolved O2 content were minimal in August and highest during winter. Low concentrations occurred in the Raritan River, especially during the summer preceding operation of a trunk sewer. The primary source of NO3-N was outflow from the Raritan River. Prior to operation of a trunk sewer, the river may have discharged significant quantities of PO4-P into the bay. Throughout spring and summer, PO4 concentrations rose and NO3 decreased. It is postulated that the resultant low N/P ratio was partially due to an efficient nutrient regeneration mechanism that favored the rate of P renewal. A combination of rich nutrient supplies arising from natural and domestic sources, plus a sluggish circulation, efficient nutrient regeneration mechanism, and scarcity of macroscopic algae combine to form an estuarine environment capable of supporting extremely dense plankton populations.

Citation 227

JEFFRIES, HARRY P.

Graduate School of Oceanography, University of Rhode Island, Kingston, RI

Comparative Studies on Estuarine Zooplankton

Limnol Oceanogr

1964,9(3),348-358.

English

The seasonal cycle of zooplankton in Raritan Bay, New Jersey, was compared with Narragansett Bay, Rhode Island, and the York River, Virginia, to determine the effects of local conditions on latitudinal gradients in species distributions. The dominant copepods in each estuary, Acartia clausi and A. tonsa, alternated cycles of abundance in a similar and predictable manner, and the distribution of Eurytemora spp. reflected the salinity distribution in several embayments. Relative proportions of the major groups comprising the temporary plankton differed significantly between estuaries. Paucity of lamellibranch larvae in the Raritan system probably resulted from organic debris in the water column, whereas the importance of Balanus nauplii in the York River appeared to be the expression of a natural zoogeographic pattern. Local irregularities were noticed in Raritan Bay when A. tonsa disappeared during summer. This highly abnormal situation paralleled drastic fluctuations in the phytoplankton. Lamellibranch veligers and Balanus nauplii increased in numbers where pollution had been reduced. Plant nutrients arising from discharged wastes and land runoff produced fertile conditions for an extremely dense and persistent spring bloom of phytoplankton. The overabundance of food or associated factors may have been responsible for delayed reproduction by Balanus and polychaetes.

Citation 228

JENKINS, DAVID

California Univ. , Berkeley, Sanitary Engineering Research Lab.

The Differentiation, Analysis, and Preservation of Nitrogen and Phosphorus Forms in Natural Waters

Trace Inorganics in Water, Adv in Chem Ser, Amer Chem Soc

1968, No. 73,265-280.

English

For waters of varying salinity, such as San Francisco Bay, techniques were developed for differential analyses of suspended and soluble organic nitrogen, ammonium-nitrogen, nitrite-nitrogen, nitrate-nitrogen; total and soluble phosphorus; soluble orthophosphate; and condensed phosphate. Certain modifications of standard methods were required. Samples preserved by storage (1) at 4 deg C, (2) at -10 deg C, (3) at 4 deg C with added 2 ml/liter of 5% sulfuric acid, and (4) at 4 deg C with mercuric chloride at 40 mg mercuric ions per liter were compared for periods of a few days to one month. For all forms of nitrogen, storage at 4 deg C with 40 mg mercury per liter was best but did not hold initial levels of organic nitrogen or nitrite-nitrogen as long as 30 days. Most satisfactory for phosphorus was storage at -10 deg C with mercury for 30 days or 4 deg C with mercury for a few days. Chloroform preservation for phosphorus caused marked reduction in soluble orthophosphate and accompanying increase in total soluble phosphorus.

Citation 229

JENSEN, ARNE, JANET R. STEIN

Univ. of Trondheim, Norway

IXth International Seaweed Symposium

Science Press, International Publishers in Science and Medicine, 8 Brookstone Drive, Princeton, N J 08540

1979,655p.

English

Information presented on seaweed resources focuses on productivity, harvesting, medicine, and physical and chemical properties.

Citation 230

JENSEN, LOREN D.

Johns Hopkins Univ. , Baltimore, MD, Dept. of Geography and Environmental Engineering

Biological Processes which Interact with and Influence the Distribution of Wastes Introduced into the Marine Environment

Background Papers on Coastal Wastes Management, prepared for National Academy of Sciences Committee on Oceanography and the National Academy of Engineering Committee on Ocean Engineering, Wash, DC

1969, Vol. 1, XIV1-XIV9.

English

Living organisms inhabiting surface waters are adapted to dilute solutions of inorganic salts, atmospheric gases and extracted organic materials. Due to the volumes involved and the dilute nature of the waste streams and coastal waters the physical, chemical and biological processes that occur when such solutions mix are considered. The main biological processes which are involved with waste stabilization are bacterial fermentation which occur on wetted surfaces. The exploitation of these processes is the primary mechanism of waste stabilization with conventional biological waste treatment systems. These biological processes which interact with and influence the distribution of wastes are discussed in detail.

Citation 231

JOHNSON, R. W.

North Carolina State Univ. , Raleigh, Dept. of Marine Sciences

Inflow on Secondary Productivity in an Ecosystem

North Carolina State Univ.

1974, PhD Dissertation, 123p.

English

A simulation type mathematical model of the Galveston Bay, Texas, ecosystem was developed using operations research technology. Secondary productivity measured by harvestable species (fish, crabs, shrimp) was evaluated in terms of man-related and controllable factors (quantity and quality of fresh water inflow and pollutants). Ecosystem responses to reduce pollution input and changes in freshwater inflow were evaluated and studied to determine management options. The model used information from an existing physical parameters model and relevant biological measurements. One purpose was to provide predictive information for estuarine pollution control and fisheries management (especially of migrating species such as menhaden, trout, bass, croaker, shrimp, crabs). Another purpose was to identify biological, chemical, and physical parameters needed to develop models for similar ecosystems. The model can be adapted to other ecosystems in the same temperature zone (approximately the same latitude and weather conditions). For other temperate zones and/or different environmental conditions (rain, tides), studies must determine similarities among consumers, food types and availability, and seasonal growth characteristics. Model calibration and verification needs comprehensive sampling and other data (commercial catch records, weather data, etc.). Such models provide an optimized basis for analysis using all available information.

Citation 232

JONES, D. J.

Durham Univ. (England), Dept. of Botany

Ecological Studies on Macroinvertebrate Populations Associated with Polluted Kelp Forests in the North Sea

Helgol wiss Meeresunter

1971,22,417-441.

English

Two gradients of pollution, one estuarine and one off the open coast, are described. The intervening seacoast has little or no pollution. A comparative method of pollution surveying is presented. Ecological comparison is made of the community development described for clean and polluted stations. Two ecological barriers to normal community development in the polluted environment are postulated.

Citation 233

JORGENSEN, B. B.

Aarhus Univ. (Denmark). Inst. of Ecology and Genetics

The Sulfur Cycle of a Coastal Marine Sediment (Limfjorden, Denmark)

Limnol Oceanogr

1977(Sept),22(5),814-832.

English

The cyclic transformations of inorganic sulfur compounds in the sediments of a Danish Fjord were followed for 2 years. The in situ rate of sulfate reduction measured with a radio-tracer technique together with chemical determinations of various sulfur compounds were used to calculate a budget of the complete sulfur cycle. Sulfate reduction rates were high at the sediment surface (25-200 nmole S02(2-)/cu cm/d), and there was still measurable activity at a depth of 1.5 m. Sulfate reduction also was compared with the benthic community metabolism measured as the oxygen uptake rate of the sediment. Sulfate reduction accounted for 53% of the total mineralization of organic matter in the sediment. Only 3% of the sulfide was derived from organic sulfur. Of all the sulfide produced, 10% was precipitated by metal ions within the anoxic sediment, while the rest was reoxidized at the surface. The results demonstrated the dynamic nature of the sulfur cycle, with turnover times for sulfate of 4-5 months and for free sulfide of 1-5 days. The calculations illustrated the dynamic nature of the sediment system and the danger of drawing conclusions from pool sizes to process rates.

Citation 234

JUPP, B. P.

Durham Univ. (England), Dept. of Botany

The Effects of Organic Pollution on Benthic Organisms near Marseille

Int J Environ Stud

1977,10,119-123.

English

A quantitative survey of sublittoral marine organisms was carried out in polluted and unpolluted waters near Marseille (France). Samples from rocky substrates indicate that organic pollution effects have not decreased since earlier surveys. Studies on beds of Posidonia oceanica, the dominant Mediterranean sea grass, show that its biomass is low in the polluted Gulf of Marseille compared with that in unpolluted bays near Marseille and with data from Malta. Crops were particularly low in shallow water to 15m where it is suggested that grazing by echinoids, whose numbers are probably encouraged by high levels of organic material, could be an important factor limiting growth, as well as other factors such as low underwater irradiance and detergent toxicity. Along the most polluted coastline near the main sewer outlet at Cortiou, Posidonia was absent and is probably excluded by indirect and direct effects of the effluent. The decline of these sea grass beds has serious implications for sediment stability and the survival of associated biota.

Citation 235

KAHN, LLOYD, FRANCIS T. BREZENSKI

Federal Water Pollution Control Administration, Metuchen, NJ, Hudson-Champlain and Metropolitan Coastal Comprehensive Water Pollution Control Project

Determination of Nitrate in Estuarine Waters--Comparison of a Hydrazine Reduction and a Brucine Procedure and Modification of a Brucine Procedure

Environ Sci Technol

1967(June),1(7),488-491.

English

Nitrate levels in estuarine waters were evaluated by hydrazine reduction and a brucine procedure. Low results were often obtained with the hydrazine procedure presumably due to depletion of available hydrazine by environmental components in the system, resulting in incomplete reduction of nitrate. The brucine method of Jenkins and Medsker was modified to provide a better behavior of the Beer-Lambert law. The modification involves carrying out the reduction step in boiling water, rather than at 20 deg C. Evidently the reaction kinetics are such that at the elevated temperature no break in the calibration curve is observed, the procedure resulting in the linearity of from 0 to 0.6 milligrams of nitrate-nitrogen per liter. The precision of the modified-brucine procedure was evaluated to be better than 0.03 milligram of nitrate-nitrogen per liter.

Citation 236

KALLGUIST, T.

Algal Growth Potential of Six Norwegian Waters Receiving Primary, Secondary and Tertiary Sewage Effluents

Verh Int Verein Limnol

1975,19,2070-2081.

English

Experiments with algal growth in mixtures of three different kinds of treated sewage and six receiving waters have shown that the growth potential depends on composition of receiving water as well as waste water. With chemically treated waste water the phosphorous concentration of the receiving water is critical. Primary wastes have the higher level of nutrients and give the greatest increase in growth potential.

Citation 237

KALMAZ, E. V.

Dept. of Engineering Science and Mechanics, Univ. of Tennessee, Knoxville, TN 37916

Mathematical Model and Computer Simulation of the Population Dynamics of Zooplankton in Lake and Estuary Ecosystems

Ecol Model

1978,5(3),225-235.

English

A mathematical model is developed for predicting the time-variant population levels and survival probabilities of zooplankton under conditions where the production rate is constant and the life-span distribution is independent of time, and different species propagate independently of each other. Basic digital computer simulation methodology is employed for the solution and analysis of the relevant equations. The model is not applicable to open ecosystems.

Citation 238

KANG, J. W.

Pusan Fisheries Coll. (Republic of Korea)

Diseases of the Cultivated Porphyra at Culture Beds with Special Reference to the Effects of Fertilizer Plant Effluents

Bull Kor Fish Soc

1972,5(2),39-44.

Korean

The Chinhae Bay (Korea) and adjacent waters were contaminated with fertilizer plant effluents. The photosynthetic activity of P. suborbiculata is lower by 4% in 200 ppm, 20% in 300 ppm and 43% in 1000 ppm of contaminated seawater containing diluted pollutants from the fertilizer plant. Photosynthesis was depressed about 21-34% near the fertilizer plant, and in the area of the Porphyra beds, 15% in the portion where tide is weak and 5% where the tide is strong, in comparison with the area of unpolluted water.

Citation 239

KARLGREN, LARS , KRISTER LJUNGSTO

Natl Env Protection Board, Sweden

Nutrient Budgets for the Inner Archipelago of Stockholm

J Water Pollut Control Fed

1975 (Apr),47 (4),823-833.

English

The nutrient budget of the Inner Archipelago of Stockholm is discussed. About 60% of the total phosphorus and only 40% of the total nitrogen entering the basin is retained in the inner basin. Concentrations of one or more nutrients other than nitrogen that can really be controlled should be reduced to such low levels that nitrogen cannot be the limiting factor. A drastic increase in the nitrogen to phosophorus ratio in the Archipelago is anticipated, so phosphorus will become the limiting growth factor. (1 diagram, 5 graphs, 1 map)

Citation 240

KEEGAN, ROBERT T. , J. VENN LEEDS, JR.

Rice Univ. , Lab. of Environmental Science and Engineering, Houston, TX

Dynamic Programming and Estuarine Water Quality Control

Water Resour Bull

1970(Apr),6(2),235-248.

English

Water quality management problems and similar problems (eg, air quality) are amenable to solution by the use of dynamic programming. The dynamic programming algorithm allows one to deal with any physical water quality model. Dynamic programming and the use of Lagrangian multipliers not only solves the water quality management problem for given quality constraints but also permits one to observe the trade-off between quality and cost of achieving the quality. The additional advantage of solving several other problems "free of charge" is not to be overlooked. The disadvantages associated with the algorithm are offset by its advantages.

Citation 241

KETCHUM, BOSTWICK H.

Woods Hole Oceanographic Institute, MA

Eutrophication of Estuaries

WHOI or IN: Eutrophication: Causes, Consequences, Correctives. International Symposium on Eutrophication. Proceedings. (Held in Madison, Wisc. , June 11 - 15,1967.) Sherry, Sol et al. (edited by). National Research Council. Publ No. 1706 Thrombosis. X + 762p. Illus. National Academy of Sciences: Wash. D. C.

1969, WHOI Contribution No. 1960,197-209.

English

Eutrophication processes for estuaries are described. Major factors considered are characteristics of estuarine circulation; distribution of salinity, oxygen, and phosphorus; and the nutrient cycle.

Citation 242

KHALID, R. A. , W. H. PATRICK, R. P. GAMBRELL

Louisiana State Univ.

Effect of Dissolved Oxygen on Chemical Transformations of Heavy Metals, Phosphorus, and Nitrogen in an Estuarine Sediment

Estuarine Coast Mar Sci

1978(Jan),6(1),21-36.

English

The effect of DO on the chemical transformations of iron, manganese, zinc, copper, lead, nitrogen, and phosphorus in an estuarine sediment suspension under laboratory conditions was investigated. Phosphorus and nitrogen concentrations decreased sharply as a result of increased redox potential levels in the 2.1% and 21% oxygen levels. The effect of the 0.11% oxygen treatment was neglible. These data indicate that oxidized sediment conditions may be an important factor that regulates eutrophication by reducing the levels of phosphorus and nitrogen available for biota. Thus, changes in the DO concentration in sediment-water systems should be studied carefully.

Citation 243

KIMBALL, M. C.

Miami Univ. , Coral Gables, FL

Effect of Thermal Effluent on Nitrogen Fixation in the Sediments of Guayanilla Bay, Puerto Rico

Miami Univ.

1977(June),112p.

English

Nitrogen fixation by sediment microflora was studied from March, 1976 through January, 1977 in Guayanilla Bay on the south coast of Puerto Rico. The study site was located in an area which receives thermal effluent from a power plant. The temperatures annually ranged from approximately 25 exp 0 to 30 exp 0 C in the control areas, and from approximately 30 exp 0 to 40 exp 0 C in the discharge area. Rates of nitrogen fixation were measured in situ with the acetylene reduction technique. High rates of nitrogen fixation generally corresponded with the development of blue-green algal mats. A blue-green algal mat, predominantly composed of Microcoleus vaginatus, formed in the discharge area when temperatures were at or above 35 exp 0 C. Chlorophyll-a content in this mat reached maximum values of 600 mg/meter exp 2 in shallow areas (ie, depths of 0.5 meter or less). The highest rates of nirogen fixation were found in portions of the mat growing in the intertidal zone in August. These rates ranged as high as 2.17 and 0.76 mg/meter exp 2/hour for light and dark incubated samples, respectively. Rates of nitrogen fixation decreased with depth, and hence also light intensity. Despite high rates of fixation by light incubated samples (hence, predominantly photosynthetic organisms), dark heterotrophic processes (bacteria) appeared to account for the majority of nitrogen fixed in the blue-green algal mat during a twenty-four hour period.

Citation 244

KINSMAN, B. , J. R. SCHUBEL, M. J. BOWMAN, H. H. CARTER, A. OKUBO, D. W. PRITCHARD, R. E. WILSON

Marine Sciences Research Center, State University of New York, Stony Brook, NY 11794

Transport Processes in Estuaries: Recommendations for Research

Mar Sci Res Cent, State Univ. of New York

1977(Apr), Special Rep. 6,21p.

English

A review of the state of current knowledge of transport processes in estuaries is presented. A better description and quantification of those terms in the equations of motion not given 'a priori' by the physics of the flow and commonly referred to as 'diffusive' or 'dispersive' remain elusive goals. Proper verification and testing of three-dimensional time-varying models that are universally applicable to different types of estuaries have yet to be undertaken. A set of field experiments is outlined in broad terms. It is hoped that these experiments will provide new insight into basic nonadvective transport mechanisms in various types of estuaries ranging from well-mixed to highly stratified.

Citation 245

KIORTSIS, V. , M. MORAITOU-APOSTOLOPULOU

Athens Univ. (Greece), Zoological Lab, and Museum

Marine Cladocera (Crustacea) in the Eutrophicated and Polluted Saronic Gulf

Isr J Zool

1975,24(1-2),71-74.

English

Six species of planktonic cladocerans were determined and seasonally measured in the Saronic Gulf of the Aegean Sea, characterized by a high degree of pollution in the northern part where the main sewage outfall from the Athens-Piraeus area is located and where large quantities of industrial wastes and hydrocarbon products from the Elefsis industrial zone enter the marine environment. Surface zooplankton were collected during nine cruises between August 1969 and June 1973, in order to obtain an overall picture of the zooplanktonic community in relation to oceanographic parameters and the degree of pollution in the gulf which varies from north to south. Evadne spinifera Muller is the commonest and most abundant cladoceran of Saronic Gulf. This thermophilic species reaches a maximum with the higher water temperatures, strongly decreases in winter and disappears from samples when the water temperature reaches its annual minimum. Evadne tergestina Clauss, also thermophilic, has a higher temperature range than E. spinifera. Also found were Evadne nordmani Loven, Podon intermedius Lillijeborg, P. polyphemoides Levekart and Penilia avirostris Dana. P. nordmani had not been previously found in the Aegean Sea. The Penilia species, a neritic form prefering lower salinities, is explained by large amounts of suspended detritus and dissolved organic matter and by the relatively shallow character of the gulf.

Citation 246

KIRYUKHINA, L. N. , M. I. KUCHERENKO, O. G. MIRONOV

Institute of Biology of the Southern Seas, Sevastopol (USSR)

Marine Soil Pollution and Self-Purification

Gidrobiol Zh

1974,10(2),55-59.

Russian

A detailed analysis is given of the physicochemical composition of the bottom sediments, distribution of chemical components with depth and the species composition, density and regularity of occurrence of cabohydrate oxidating microorganisms. The data show weak self-purification processes in the bottom sediments of the bay.

Citation 247

KISTRITZ, RON U.

Weatwater Research Centre, The University of British Columbia ,
2075 Westbrook Mall, Vancouver, B. C. , Canada, V6T 1W5

Recycling of Nutrients in an Enclosed Aquatic Community of Decomposing Macrophytes (Myriophyllum spicatum)

OIKOS

1978,30,561-569.

English

A 0.5 m^2 area of littoral zone in an eutrophic reservoir dominated by the aquatic vascular plant Myriophyllum spicatum L. was enclosed in order to study, in situ, the release of nitrogen (N) and phosphorus (P) compounds as the enclosed plant community decomposed. Decomposition is shown to be complete in about 50 d. Fixed N appeared mainly as NH_3 at a maximum rate of 380 ug l^{-1} d^{-1}. P was mobilized mainly as PO_4 at a maximum rate of 34 ug l^{-1} d^{-1} and also as soluble organic -P. Aquatic macrophytes accounted for only 3 to 4% of the regenerated N but for 40 to 44% of the regenerated P recycled by the enclosed system; blue green algae and the mud surface accounted for the balance of the regenerated N and P. Total suspended bacterial biomass represented an average of 10% of the total organic N and P pool of the water column. The role of aquatic macrophytes, blue green algae and mud surface is discussed in terms of the recycling of N and P.

Citation 248

KLAVESTAD, N.

Ringgt. 56, N-1700 Sarpsborg, Norway

The Marine Algae of the Polluted Inner Part of the Oslofjord

Bot Mar

1978,21,71-97.

English

The benthic algal vegetation of the inner, polluted part of the Oslofjord was investigated during the period 1962-66. Observations were made at 101 localities, and the area was divided into four sub-areas, each with its characteristic floristic features. A brief general description of the vegetation of the different sub-areas is given. The Oslofjord has previously been subjected to algological investigations by Sundene (1953) and Grenager (1957), and the results of the present survey are compared with their results. The survey contains descriptions of seasonal and annual variations in the vegetation throughout the whole area. On the basis of the available data on salinity, temperature, currents, pollution and other ecological factors, the distribution patterns of the various algae are discussed. Finally, there is a floristic list with information on life cycle stages of the various species.

Citation 249

KLEIBER, P. , W. E. ERLEBACH

Inland Waters Directorate, Pacific and Yukon Region, Water Quality Branch, Vancouver, British Columbia

Limitations of Single Water Samples in Representing Mean Water Quality. III. Effect of Variability in Concentration Measurements on Estimates of Nutrient Loadings in the Squamish River, B. C.

Inland Waters Directorate

1977, Technical Bull. No. 103,9 p.

English

An examination of the effect of variability in concentration measurements on estimates of nutrient loadings in the Squamish River and its tributaries has shown the limitations that result from the use of data derived from infrequent single grab samples. By the use of Monte Carlo techniques, the precision and accuracy of various measurement approaches were assessed. Correlations between discharge, measured continuously, and nutrient concentration, measured intermittently, provide a means of generating precise and accurate loading estimates.

Citation 250

KNAPP, GEORGE L.

Office of Water Resources Research, Washington, DC, Water Resources Scientific Information Center

Aeration of Natural Waters: A Bibliography

WRSIC

1973 (Jul), WRSIC-73-206,363p.

English

The report, contains 240 abstracts on improving water quality by artificial aeration. It is another in a series of planned bibliographies in water resources to be produced from the information base comprising Selected Water Resources Abstracts (SWRA). At the time of search for this bibliography, the data base had 53,230 abstracts covering SWRA through February 15,1973 (Volume 6, Number 4). Author and subject indexes are included.

Citation 251

KNUDSON, K. , C. E. BELAIRE

Texas Parks and Wildlife Dept. , Seabrook Marine Laboratory, P. O. Box 8, Seabrook 77586

Causes and Probable Correctives for Oxygen Depletion Fish Kills in the Dickinson Bayou Estuary: a Field Study and Simplified Algal Assay .

Contrib Mar Sci (Port Aransas)

1975(Aug),19,37-48.

English

Frequent oxygen depletion fish kills, caused by dense algal blooms, have occured during summers in the six-kilometer portion of Dickinson Bayou directly upstream from two sewage treatment plants. These plants are the major contributors of waste to the bayou. During summer periods of low action , causing dense algal blooms;algal density is much less above the tidal influence and downstream from the plant outfalls. Algal assays demonstrated that if the plants employed chemical coagulation to remove the phosphorus, the summer algal densities in the critical six-kilometer portion of the bayou would be reduced to concentrations corresponding to, or less than, the levels found in the rest of the bayou. Such treatment would thereby reduce the probability of summer fish kills.

Citation 252

KOIKE, I, A. HATTORI

Univ. of Tokyo, Ocean Research Inst. , Nakano, Tokyo, 164 Japan

Simultaneous Determinations of Nitrification and Nitrate Reduction in Coastal Sediments by a 15N Dilution Technique

Appl Environ Microbiol

1978(May),35(5),853-857.

English

Nitrification and nitrate reduction by bacteria in coastal sediments of MangoVu-Ura and Odawa Bay were simultaneously determined by a 15N dilution technique. In muddy sediments of Mangoku-Ura, nitrate reduction proceeded at a rate of 10-2 to 10x10-2 ug-at of N/g/hr, Nitrification was far less intensive. Denitrification accounted for 30% of the nitrate reduction. A simultaneous occurrence of nitrification and nitrate reduction with a similar rate of 10-2 ug-at of N/g/hr was demonstrated in sandy sediment collected from a Zostera bed of Odawa Bay.

Citation 253

KRAMER, G. R.

New Mexico Univ. , Albuquerque, NM, Eric H. Wang Civil Engineering Research Facility

Predicting Reaeration Coefficients for Polluted Estuary

J Environ Eng Div Am Soc Civ Eng

1974(Feb),100(EE1),77-92.

English

Reaeration rate coefficients measured in polluted estuaries were compared to those predicted from equations that predict reaeration coefficients in natural streams. Many of the currently available equations relating K2 with the physical and hydrodynamic characteristics of the waterway are described along with some of the conditions under which they were derived or determined. The effects of wind, temperature, and surface active agents on reaeration are reviewed. A number of the given equations were applied to the Houston Ship Channel in an attempt to predict K2. The predicted K2 was usually less than 1/100 of the measured K2. It is concluded that none of these equations are applicable to the upper Houston Ship Channel area.

Citation 254

KRAUS, MARJORIE

Delaware Univ. , Newark. Coll. of Marine Studies

Host Range Study of Blue-Green Algal Viruses

Delaware Univ.

1974(Apr), Rep. No. DEL-SG-1-74,33p.

English

The paper is a progress report summarizing the information gained on the molecular ecology of a host/virus system covering a rather wide range of blue-green algal viruses and their hosts. Knowledge gained to date from the host-range data has been applied in: Interpreting survival curves of blue-green algal viruses as a function of radiation dose; formulating a methodology for the examination of fish kills; characterizing new and old viruses; and establishing a blue-green algal host/virus system as a model of principles and mechanisms in the examination of viruses in polluted or eutrophic water.

Citation 255

KRUTCHKOFF, RICHARD G. , WILLIAM R. SCHOFIELD

Virginia Polytechnic Inst. and State Univ. , Blacksburg, VA

Stochastic Model of Dynamic Eutrophic Estuary

J Environ Eng Div Am Soc Civ Eng

1974(June),100(E3),613-628.

English

Citation 256

KUENZLER, E. J. , A. F. CHESTNUT

Institute of Marine Sciences, University of North Carolina, Chapel Hill and Morehead City, NC

Structure and Functioning of Estuarine Ecosystems Exposed to Treated Sewage Wastes

Univ. of North Carolina

1971(Feb), Annual Rep. 1970-1971.

English

This is the third annual report from an investigation of the ecological systems which develop when estuarine waters are enriched with sewage wastes. Faculty and students from the University of North Carolina have studied various phases of community structure and metabolism of six experimental brackish-water ponds, three of which receive treated sewage wastes, and of a small tidal creek and its salt marshes. In this report are chapters on productivity, carbon metabolism, the phosphorus budget, nitrogen, and bacterial heterotrophy; on the standing crops of phytoplankton, decapod crustaceans, fishes, meiofauna, foraminifera, insects, molluscs, and birds; on calcium analysis; and on growth and reproduction of algae. The waste ponds have developed into productive, well-integrated, but slightly unstable systems. They perform some of the functions of tertiary treatment and hold promise for production of harvestable seafood protein.

Citation 257

LACOMBE, D. , W. MONEIRO

Instituto Oswaldo Cruz, Rio de Janeiro (Brazil)

Balanidae as Pollution Indicators in the Bay of Guanabara

Rev Bras Biol

1974,34(4),633-644.

Portuguese

Certain barnacle species are useful as pollution indicators. Among the different species occurring in the Bay of Guanabara (Brazil) Balanus amphitrite amphitrite is the best pollution indicator. This is the only dominant and widespread species in the bay. Three varieties of B. tintinnabulum were observed in the entrance of the bay and the Tetraclita squamosa stallactifera in the Flamengo, Botafogo and surroundings. Only B. a. amphitrite is dominant in the bay; it resists all grades of pollution.

Citation 258

LAI, C.

Geological Survey, Reston, VA Water Resources Div.

Computer Simulation of Two-Dimensional Unsteady Flows in Estuaries and Embayments by the Method of Characteristics--Basic Theory and the Formulation of the Numerical Method

Geological Survey, Water Res. Div.

1977(Aug), Water-Resources Invest. 77-85,72p.

English

Two-dimensional unsteady flows of homogeneous density in estuaries and embayments can be described by hyperbolic, quasi-linear partial differential equations involving three dependent and three independent variables. A linear combination of these equations leads to a parametric equation of characteristic form, which consists of two parts: total differentiation along the bicharacteristics and partial differentiation in space. For its numerical solution, the specified-time-interval scheme has been used. The unknown, partial space-derivative terms can be eliminated first by suitable combinations of difference equations, converted from the corresponding differential forms and written along four selected bicharacteristics and a streamline. Other unknowns are thus made solvable from the known variables on the current time plane. The computation is carried to the second-order accuracy by using trapezoidal rule of integration. Means to handle complex boundary conditions are developed for practical application. Computer programs have been written and a mathematical model has been constructed for flow simulation. The favorable computer outputs suggest further exploration and development of model worthwhile.

Citation 259

LAKE, CAROL A. , WILLIAM G. MACINTYRE

Virginia Polytechnic Inst. and State Univ. , Blacksburg.
Virginia Inst. of Marine Science, Gloucester Pt. , VA,
Prepared by VIMS

Phosphate and Tripolyphosphate Adsorption by Clay Minerals and Estuarine Sediments

VPI-VWRRC-Bull

1977(June),109,64p.

English

This investigation sought to provide additional needed information on overenrichment of estuarine areas by examining the extent to which phosphate nutrients are taken up by clay sediments in estuarine and marine environments. Examined specifically was the adsorption of orthophosphate and tripolyphosphate by the four clay minerals most commonly found in Virginia estuaries. A factorial analysis was applied to the design of the experiments in order to examine statistically the effect of pH, salinity, temperature, and initial phosphate concentration on orthophosphate adsorption. The main effects of pH and initial phosphate concentration were statistically important to orthophosphate adsorption by each of the clays increased in the following order: montmorillonite--kaolinite- -illite--chlorite. The orthophosphate adsorption by synthetic clay demonstrated the generality of the adsorption experiments, for similar units were adsorbed by both synthetic and natural clays. When the source of phosphorus was tripolyphosphate rather than orthophosphate, each clay adsorbed more phosphorus under similar reaction conditions.

Citation 260

LEE, WEN YUH

Univ. of Texas, Marine Science Inst. , Port Aransas Marine Laboratory, Port Aransas, TX 78373

Some Laboratory Cultured Crustaceans for Marine Pollution Studies

Mar Pollut Bull

1977,8(11),258-259.

English

Three laboratory cultured crustaceans are recommended for use in marine pollution studies because they are characterized by (1) wide distribution, (2) a short life cycle, (3) high reproductive potential, and are (4) representative of the plankton and benthos in coastal waters and the intertidal zone, where oil spills most often occur and refinery wastes are discharged. Methods of culturing these crustaceans are described.

Citation 261

LEEDS, J. V.

Rice Univ. , Houston, TX

Accuracy of Discrete Models Used to Predict Estuary Pollution

Water Resour Res

1967,3(2),481-490.

English

In the solution of estuary pollution problems, the mathematical model is a partial differential equation, which is often replaced by a set of ordinary differential equations with time as the independent variable. The solution to these equations is taken as the solution of the partial differential equations at points dx apart. A significant problem is to determine the closeness of the solution of the ordinary differential equation to the solution of the partial differential equation, the spacing, and the number of sections. The closeness of the solution can be judged by examining the magnitude and phase of the frequency response of the partial differential equations and the set of ordinary differential equations. Selecting a given phase error allows one to obtain a relation giving the allowed spacing. Selecting an attenuation error sets the number of sections. Thus, from the knowledge of the frequency response of the system the rules developed give the number of sections and spacing to meet specified errors in the approximation.

Citation 262

LEENDERTSE, J. J. , A. B. NELSON

Rand Corp. , Santa Monica, CA

A Water Quality Simulation Model for Well Mixed Estuaries and Coastal Seas: Volume IX, the Computer Program

Rand Corp.

1978(Apr), Rep. No. R-2298-RC , 90p.

English

The computer program in its present form can be used to compute the flow and pollutant distributions in a certain region if the hydrodynamic and transport equations described are representative of the fluid motions and transport of constituents; information is available about depth to a certain reference level; the bathymetry can be approximated with sufficient detail (computer memory and computer time requirements per run are proportional to the second and roughly third power, respectively, of the reciprocal of the space grid size); sufficient data are available for model adjustment; input water level histories at a single boundary at the left side of the model are available for forcing the model; time varying wind and discharge information is available; and currents are relatively weak and the system quite well dampended so that stability conditions of the advection terms are not exceeded.

Citation 263

LEHMANN, EDWARD J.

National Technical Information Service, Springfield, VA

Water Quality Modeling. A Bibliography with Abstracts

NTIS

1974 (May), NTIS-WIN-74-036,163p.

English

The bibliography contains 158 selected abstracts of research reports retrieved using the NTIS on-line search system- -NTISearch. The abstracts contain information on models used to describe water quality. This covers models of the chemical, physical, biological, and hydrological processes important to water quality. Included are studies on the modeling of eutrophication, nutrient removal, pollutant dispersion, stream flow, heat dissipation, limnological factors, and storm water runoff. Rep. for 1964-Apr 74.

Citation 264

LEHMANN, EDWARD J.

National Technical Information Service, Springfield, VA

Water Quality Modeling- -Hydrological and Limnological Systems (A Bibliography with Abstracts)

NTIS

1975 (May),218p.

English

The abstracts contain information on models used to describe water quality. This covers models of the chemical, physical, biological, and hydrological processes important to water quality. Included are studies on the modeling of eutrophication, nutrient removal, pollutant dispersion, stream flow, heat dissipation, limnological factors, aquifer water quality, and water runoff quality. (Contains 213 abstracts). Rept. for 1964-May 75

Citation 265

LEHMANN, EDWARD J.

National Technical Information Service, Springfield, VA

Water Quality Modeling. Hydrological and Limnological Systems. Volume 2.1975-June 1976 (A Bibliography with Abstracts)

NTIS

1976(June), NTIS/PS-76/0444/0ST, 103p.

English

The abstracts contain information on models used to describe water quality. This covers models of the chemical, physical, biological, and hydrological processes important to water quality. Included are studies on the modeling of eutrophication, nutrient removal, pollutant dispersion, stream flow, heat dissipation, limnological factors, aquifer water quality, and water runoff quality. (This updated bibliography contains 98 abstracts, 79 of which are new entries to the previous edition.) See also NTIS/PS-76/0443, Water Quality Modeling--Hydrological and Limnological Systems. Vol. 1.1964-1974.

Citation 266

LEHMANN, EDWARD J.

National Technical Information Service, Springfield, VA

Water Quality Modeling. Hydrological and Limnological Systems. Volume 1.1964-1974 (A Bibliography with Abstracts)

NTIS

1976(June), NTIS/PS-76/0443/2ST, 197p.

English

These abstracts of Federally-sponsored research cover studies on models used to describe water quality. This covers models of the chemical, physical, biological, and hydrological processes important to water quality. Included are studies on the modeling of eutrophication, nutrient removal, pollutant dispersion, stream flow, heat dissipation, limnological factors, aquifer water quality, and water runoff quality. (This updated bibliography contains 192 abstracts, none of which are new entries to the previous edition.)

Citation 267

LEHMANN, EDWARD J.

National Technical Information Service, Springfield, VA

Water Quality Modeling -Hydrological and Limnological Systems. Volume 2.1975-June 1977. (A Bibliography with Abstracts)

NTIS

1977(June), NTIS/PS-77/0528/8ST, 190p.

English

The abstracts contain information on models used to describe water quality, including models of the chemical, physical, biological, and hydrological processes important to water quality. Studies are included on the modeling of eutrophication, nutrient removal, pollutant dispersion, stream flow, heat dissipation, limnological factors, aquifer water quality, and water runoff quality. (This updated bibliography contains 185 abstracts, 87 of which are new entries to the previous edition.) See also NTIS/PS-76/0443, Water Quality Modeling--Hydrological and Limnological Systems. Vol. 1.1964-1974.

Citation 268

LEHMANN, EDWARD J.

National Technical Information Service, Springfield, VA

Water Quality Modeling- -Hydrological and Limnological Systems. Volume 3. July, 1977 -June, 1978 (A Bibliography with Abstracts)

NTIS

1978(June), NTIS/PS-78/0650/8ST, 92p.

English

The abstracts contain information on models used to describe water quality, including models of the chemical, physical, biological, and hydrological processes important to water quality. Studies are included on the modeling of eutrophication, nutrient removal, pollutant dispersion, stream flow, heat dissipation, limnological factors, aquifer water quality, and water runoff quality. (This updated bibliography contains 86 abstracts, all of which are new entries to the previous edition.)

Citation 269

LEPPAEKOSKI, E.

Aabo Akademi, Inst. of Biology, SF-20500 AABO 50, Finland

Monitoring the Benthic Environment of Organically Polluted River Mouths

IN: Biological Monitoring of Inland Fisheries. Edited By J. S. Alabaster. London: Applied Science Publishers

1977,125-132.

English

Studies were made of the soft bottom macrofauna of some organically polluted brackish water areas at river mouths in southwest Finland and western Sweden and papers on the subject are reviewed. A benthic pollution index (BPI) was developed for estimating the distribution and relative degree of pollution by relating the extent of pollution zones to the whole area of the waste receiving water. Compared with other biological pollution indexes used in studying rivers and river mouths, the BPI has the advantage of comparing overall conditions in different areas. It simplifies taxonomic work, is related to the availability of food for bottom feeding fish, and is especially suitable for longterm monitoring. The use of the BPI method is restricted to long and rather sheltered river mouths or gradient type estuaries loaded by municipal or other wastewaters, rich in organic substances. In open coastal areas, >1 of the pollution zones may fail to appear. Thermal pollution or toxic substances affect aquatic biota differently from organic material and easily conceal changes caused by eutrophication or organic pollution. The BPI method is based on quantitative biological analyses rather than on merely qualitative identification of several indicator species. It also replaces lists of scientific names and complicated terms by numerical values.

Citation 270

LEUNG TACK KIT, D.

Centre d'Oceanographie, Marseille (France), Station Marine d'Endoume

Study of a Polluted Environment (The Old Port Area of Marseilles): The Influence of Physical and Chemical Conditions on the Characteristics of the Population of the Quay

Tethys

1971(1972),3(4),767-825.

French

The seasonal changes of several hydrological factors (temperature, dissolved oxygen, salinity, nutrients, seston, particulate C and N, detergents), and their influence in the fauna and flora of the quay were studied. The hydrological data show the circulation in the 2 basins, the undersaturation of dissolved oxygen in the harbor water, its freshening and its important reserve of nutrients. These conditions are favorable to substantial plankton production. The great quantity of organic material maintains the biological degradation by an 'autopollution'. The quay settlement is composed of an association of species resistant to extreme conditions and variations of the environment.

Citation 271

LEVIN, GILBERT V.

Director, Life Systems Division, Hazleton Lab, Inc. , Falls Church, VA

The New Pollution

J Civ Eng Div Am Soc Civ Eng

1967(May),37(5),68-71.

English

Urbanization, increased use of fertilizers and detergents, and, paradoxically, advances in wastewater treatment are accelerating the problem of eutrophication. The problem and a relatively low cost method of control are described.

Citation 272

LEVY, E. M. , C. C. CUNNINGHAM, C. D. W. CONRAD, J. D. MOFFATT

Bedford Inst. of Oceanography, Dartmouth (Nova Scotia), Atlantic Oceanographic Lab

A Titration Apparatus for the Determination of Dissolved Oxygen in Seawater

J Fish Res Board Can

1977,34(11),2218-2220.

English

A novel titration apparatus for the Carritt/Carpenter modification of the Winkler method for determining dissolved oxygen in seawater was described. Routine quantitative analyses for oxygen are made more reliable and more convenient by reducing the human factor.

Citation 273

LIBERTI, LORENZO , GIANFRANCO BOARI

Istituto Ricerca Sulle Acque, C. N. R. , 5 via De Blasio, 70123 Bari, Italy

Phosphates and Ammonia Recovery from Secondary Effluents by Selective Ion Exchange with Production of a Slow-Release Fertilizer

Water Res

1979,13(1),65-71.

English

A process for the reduction of eutrophic potential in urban secondary effluents, which comprises the selective exchange of phosphates in a weak anion resin and of ammonia on clinoptilolite, is described. Sodium chloride is used to regenerate both resins, with some Ca(OH)2 added for clinoptilolite. By adding Mg(OH)2, eventually precipitated with lime from sea water, the premium quality, slow-release fertilizer, MgNH4PO4.6H2O is recovered from the concentrated regeneration streams, which can then be recycled. Laboratory evaluations of the hydrolysis extent of the weak anion resin in the presence of bicarbonates showed that a steady-state is attained with resin exchange capacity reproducibly averaging about 80 mmol phosphate 1-1. The preliminary runs on a pilot plant for the tertiary treatment of urban sewage are also presented.

Citation 274

LIMA, HILDA DE SOUZA, P. J. LEB. WILLIAMS

Department of Oceanography, The University, Southampton, U. K.

Oxygen Consumption by the Planktonic Population of an Estuary--Southampton Water

Estuarine Coastal Mar Sci

1978,6,515-521.

English

The short term rate of oxygen consumption of water samples taken from Southampton Water was determined over the period February to September 1972. The rates varied from undetectable (<10 ul 02 1-1 day-1) to 570 ul O2 1-1 day-1. In the winter months, the highest rates of oxygen consumption were found in water samples from the upper half of the estuary, where they were typically 100-200 ul O2 1-1 day-1. There was an increase in the rate of oxygen consumption in the summer months; for the stations within the estuary the increase over the winter rates lay in the range 200-300 ul O2 1-1 day-1. It is argued that the upper half of the estuary are sustained by inputs from external sources (sewage, industrial effluents and rivers) and that the summer increase is a consequence of phytoplankton photosynthesis.

Citation 275

LITCHFIELD, CAROL D.

Rutgers - the State Univ. , New Brunswick, NJ, Center for Coastal and Environmental Studies

Microbial Contributions to Nutrient Cycling in the New York Bight, 1 February 1976-1 January 1977

Rutgers State Univ. , New Brunswick, NJ, Center for Coastal and Environmental Studies

1978(Aug), NTIS PB-287 661/3WP, 116p.

English

The following studies are combined to form this final report: Impact of a Ceratium bloom on microbial biomass and activities in sediments of the New York Bight. Adenosine triphosphate in sediments of the New York Bight; and The effect of cadmium and petrochemicals on sedimentary microorganisms in the New York Bight.

Citation 276

LITTLER, M. M. , S. N. MURRAY

California Univ. , Irvine, CA, Dept. of Ecology and Evolutionary Biology

Influence of Domestic Wastes on the Structure and Energetics of Intertidal Communities Near Wilson Cove, San Clemente Island

California Water Resources Center

1977(June), Contribution No. 164,88p.

English

This project was directed toward studies of the role of stresses imposed by domestic waste waters on marine intertidal organisms, how natural communities of such organisms deal with high-energy inputs from the particulate matter derived from human wastes and the processes controlling community development, food web structure, primary productivity, and seasonal fluctuations in polluted waters. A primary effect of sewage stress in the upper to mid-intertidal was to maintain community development in an early disclimax stage. The outfall area successional plots showed rapid recovery--nearly 100% after less than a month, whereas communities that developed on the unpolluted experimental plots had not fully recovered after one year. The communities occupying the peripheral margins of the outfall habitat showed enhanced abundance of suspension-feeding animals. Species comprising much of the mid-intertidal turf characteristic of the sewage-disturbed area showed considerably greater productivity per unit of thallus area than most of the other macrophytes measured. Outfall populations tended to have higher energy contents than did populations from the unpolluted area. Energy-rich compounds appear to be entering the intertidal food web through the omnivores and suspension feeders of the outfall community. The outfall serves as an attractant and food source for a few species of finfish that are generalized feeders. Macrophytes with higher sewage-tolerance display low photosynthetic quotient values during exposure to effluent; higher values are associated with forms having low physiological tolerance to sewage. It is suggested that tolerant species exhibit carbohydrate metabolism during exposure to effluent stress, whereas intolerant forms tend toward protein and lipid metabolism.

Citation 277

LITTLER, MARK M. , STEVEN N. MURRAY

Dept. of Ecology and Evolutionary Biology, Univ. of California, Irvine, CA

Influence of Domestic Wastes on Energetic Pathways in Rocky Intertidal Communities

J Appl Ecol

1978,15,583-595.

English

The calorific contents of eighteen macroinvertebrates and thirty-six macrophytes were determined in an unpolluted rocky intertidal habitat and in a nearby polluted habitat. (2) Much of the variation in the calorific values of macrophytes was related to life span. The algae that characterized the unpolluted community usually contained comparatively fewer calories per unit weight. These forms had relatively more structural tissues and hence allocated relatively less energy to rapid growth and reproduction. In the polluted habitat, fugitive or opportunistic algal species were more prevalent; these had more rapid growth rates and higher productivities and tended to have relatively high calorific contents. Encrusting forms that are easily accessible to many herbivores, had thallus constituents with lower calorific values, suggesting that these algae may have evolved reduced palatability. (3) The major taxonomic groups of algae yielded the following sequence of mean calorific values: Chlorophyta, 4.78 kcal g-1 ash-free dry weight; Rhodophyta, 4.39; Cyanophyta, 4.38; Phaeophyta, 4.22. (4) In nearly every case, macroinvertebrate populations exposed to domestic sewage had higher energy contents than did corresponding populations from the unpolluted habitat. (5) Macroinvertebrates in the polluted habitat grazed greater proportions of blue-green algae and bacteria. Omnivores and suspension feeders in the polluted habitat appeared to utilize energy-rich compounds in the sewage effluent; this may explain the greater standing stocks of omnivores and suspension feeders in the peripheral regions of the outfall plume.

Citation 278

LIVINGSTON, R. J.

Florida State Univ. , Tallahassee, FL, Dept. of Biological Science

Impact of Kraft Pulp-Mill Effluents on Estuarine and Coastal Fishes in Apalachee Bay, Florida, USA

Mar Biol

1975,32,19-48.

English

Offshore areas in north Florida that received kraft pulp-mill effluents (KME) displayed significant increases in color and turbidity and reductions in dissolved O2 compared with a nearby control area. Estuarine and marsh fish assemblages in areas of acute impact were severely reduced in numbers of individuals and species. Species diversity could not be used as an indicator of pollution per se, and was useful only when considered in conjunction with various other parameters. Transition areas (between polluted and unpolluted areas) showed increases in species diversity, individuals, and species. In general, the effects of KME on offshore fish assemblages appeared to be due to a complex combination of habitat alteration, reduced benthic productivity, and behavior reactions. Overall, there were some significant changes in the biota such as reduced dominance and productivity in polluted areas that were similar for the various types of organisms sampled.

Citation 279

LOCICERO, VINCENT R.

Massachusetts Science and Technology Foundation, 10 Lakeside Office Park, Wakefield, MA 01880

Proceedings of the First International Conference on Toxic Dinoflagellate Blooms. Boston, MA, 4-6(Nov)1974

Massachusetts Science and Technology Foundation

1975(Apr),529p.

ENglish

The conference goal was to investigate all aspects of dinoflagellate blooms. Content organization was as follows: A. Dinoflagellate Blooms: an Overview B. Oceanographic Conditions Associated with Red Tide Blooms C. the Organisms D. Chemistry E. Pharmacology F. Management

Citation 280

LONG, R. R.

Johns Hopkins Univ. , Baltimore, MD, Dept. of Earth and Planetary Sciences

Three-Layer Circulations in Estuaries and Harbors

J Phys Oceanogr

1977(May),7(3),415-421.

English

A theory was developed for the three-layer circulation in an overmixed estuary (finite freshwater influx) or harbor (zero freshwater influx) accompanying a two-layer structure in the large body of water outside. A determinate set of algebraic equations was derived for the general case, and the form of the equations shows that for zero freshwater influx, the discharge q sub 1 from a harbor is proportional to the square root of the density difference between the two outside fluids. The problem is solved completely when there is a uniform depth H of the fluids inside and outside the harbor, when the freshwater influx is zero, and when the two layers of fluid outside the harbor are of equal thicknesses. The solution showed that the outflowing layer of water has a thickness d=H/2 and a flux q sub 1 = HW sq rt (H Delta b sub o)/8, where W is the width at the constriction and Delta b sub o the buoyancy difference between the two outside layers of water. A laboratory model reproduced the three-layer circulation of the theory. The outflowing fluid was quite turbulent, which made the observation of the layer thickness uncertain, but the thickness appeared to be close to the value d=H/2 of the theory.

Citation 281

LOUISIANA STATE UNIV.

Baton Rouge, Center for Wetland Resources

Proceedings of the International Symposium on Marine Pollution Research

US Environmental Protection Agency

1976(Jan), EPA-600/9-76-032,171p.

English

Symposium papers discuss how man's activities have affected natural resources of a coastal environment. Participants, representing international aspects of coastal pollution, reviewed current status of research and procedures planned to minimize offshore coastal damage. Subjects included: 'An Overview of the USEPA Program in Maine Pollution Research', Carl R. Gerber; 'Responsibilities for Marine Pollution Research Within Federal Agencies of the United States', Norman L. Richards; 'Overview of Marine Pollution Research the Baltic', K. Rozdzynski; 'Marine Pollution Research in the Baltic', K. Rozdzynski Yugoslavia: An Overview', V. Pravdic; 'Overview of Marine Pollution Research in Egypt', Saad El-Wakeel; 'Overview on Pollution in the Coastal Environment of Pakistan and its Possible Implication for the Marine Ecosystem', S. M. Haq; 'Overviews on Marine Pollution in India', K. Ranga Rao; 'Research Needs Concerning Pollution of the Marine Benthos', R. C. Swartz; 'Hydrological, Chemical and Physical Processes Affecting Pollution of the Baltic Sea', A. Trzosinska; 'Investigation of Pollution-Stressed Littoral Communities in the Northern Adriatic', D. Zavodnik; 'Microbiology and Chemistry of Estuarine Surface Microlayers', A. W. Bourquin and D. G. Ahearn; 'Survival of Viruses in the Marine Environment', George E. Schaiberger, Charles P. Gerba and Enrigue G. Estevez; 'Relationship of Marine Pollution to Human Health', Ronald Engle; 'Bioassays as Indicators of Pollution Effects', David L. Coppage.

Citation 282

LUND, J. W. G.

The Freshwater Biological Association, The Ferry House, Far Sawrey, Ambleside, Westmorland

Eutrophication

Proc R Soc Lond B Biol Sci

1972,180,371-382.

English

Eutrophication is enrichment by plant nutrients. Here man-made eutrophication is considered. The chief sources of enrichment are sewage, artificial fertilizers and agricultural wastes. Large populations of plants and animals, alive or dead, cause difficulties in the water industry and may interfere with recreation, especially fishing. Most of the phosphorus and nitrogen can be removed from sewage effluent if the cost is justified. A large reduction of agricultural run-off is impractical but some reduction is possible. The removal of polyphosphates from detergents is a palliative but a suitable replacement which does not pose a threat to the environment is not yet on the market. Though the main factors causing eutrophication are well known, there is little detailed understanding of their interaction with other environmental factors. Consequently it is not yet possible to forecast the exact changes to be expected in aquatic ecosystems, a fact which is illustrated by certain changes in two mildly enriched lakes over the last 27 years.

Citation 283

MACDONALD, G. J. , R. N. WEISMAN

Canterbury Univ. , Christchurch (New Zealand), Dept. of Civil Engineering

Oxygen-Sag in a Tidal River

J Environ Eng Div Am Soc Civ Eng

1977(June),103(EE3),473-488.

English

Freshwater flow in a tidal river was incorporated in a dimensionless solution of the derived equations for BOD and DOD, and a comparison was made between the profiles obtained with both a constant and a time variable dispersion coefficient, E. The time variation of E was expressed as the ratio of the absolute value of the oscillating velocity to a reference velocity. Flow data from the Potomac River, Washington, were used in the computer programs, and illustrative BOD and DOD profiles were presented. Increases in the river discharge decrease and translate downstream the points of maximum BOD and DOD. Time variation of the dispersion coefficient smooths both BOD and DOD profiles, as opposed to a constant value of E, and reduces their peak values. Decisions on the maximum DOD associated with a specific effluent outfall, which are based on a solution with a constant E, appear, therefore, to be conservative.

Citation 284

MACKAY, D. W. , J. I. WADDINGTON

Clyde River Purification Board, Glasgow (Scotland)

Quality Predictions in a Polluted Estuary

In: Fifth International Water Pollution Research Conference, San Francisco, July 26-Aug 2,1970

1970, Paper III-7,6p.

English

Some methods adopted by the Clyde River Purification to investigate the system are outlined, and one case for which it has been possible to look back on the accuracy of prediction is described. The main shipping channel of the Clyde Estuary receives the drainage from a heavily industrialized region with population of 2.4 million. The circulation of water in the estuary is extremely complex. During dry spells, the dissolved oxygen content of the upper estuary falls to zero for a distance of up to 20 km. The dissolved oxygen levels in the Clyde Estuary vary directly with the fresh water input and inversely with the temperature. Equations were derived linking these parameters at each of 13 stations spaced at 3.2 km; intervals seawards from the head of the estuary. The salinity, for a range of five depths at each sampling station, has been measured. Flows are expressed as percentage exceedences. Retention time in the upper 32 km of the estuary varies between 2 and 20 days depending mainly upon fresh water input. The sum of the product of BOD and retention time gives an index of pollution producing the observed dissolved oxygen deficit. It was predicted that a reduction of 13% in the overall dissolved oxygen deficit would result from beginning operation of the new treatment plant. The reduction in the dissolved oxygen deficit is 11% overall and is in satisfactory agreement with the prediction made.

Citation 285

MAGGI, P.

Institut Scientifique et Technique des Peches Maritimes, Nantes (France), Service de Pollution

The Growth of Posidonia and the Urban Pollution in the Gulf of Giens

Ann Inst Michel Pacha

1972,5(1),1-11.

French

Studies were carried out in the Gulf of Giens (France), which receives a large amount of urban pollution. This pollution may be the reason for the disappearance over a large area of Posidonia oceanica, which played a large part in fixing the light sediments. This resulted in hollowing of the sea floor and severe erosion of the sand beaches. A solution aimed at stopping the sources of pollution is considered. The problem of reconquest of the light sediments is approached by an original method of P. oceanica reimplantation. An 18 mo. trial showed that slips of the plants take root firmly in a sand bottom.

Citation 286

MAHONEY, JOHN B. , JOHN J. A. MCLAUGHLIN

National Marine Fisheries Service, Northeast Fisheries Center, Sandy Hook Laboratory, Highlands, NJ

The Association of Phytoflagellate Blooms in Lower New York Bay with Hypertrophication

J exp mar Biol Ecol

1977,28,53-65.

English

Large quantities of nutrients, including organic substances, in treated and untreated wastes, are discharged into the New York estuary. The possible relationship between annual phytoflagellate blooms in Lower New York Bay and the urban hypertrophication was investigated by means of tests of the utilization of a wide variety of organic C, N, and P compounds by the dominant phytoplanktonic organisms. Carbon compounds were tested at 50,25, and 5 mg C/l; nitrogen compounds at 1.4,0.7 and 0.14 mg N/l; and phosphorus compounds at 0.5,0.25, and 0.1 mg P/l. The results from the lowest concentration are considered of greatest environmental relevance. At the low concentrations Massartia rotundata (Lohmann) Schiller used 11, Olisthodiscus lutens Carter 14, and Prorocentrum micans Ehrenberg 15 of 20 organic carbon compounds; M. rotundata used

14, O. luteus 7, and P. micans 14 of 16 organic nitrogen compounds; M. rotundata used 6, O. luteus 8, and P. micans 7 of 8 organic phosphorus compounds. These results, together with complementary data indicating utilization of organic substances during blooms, suggest a bloom-hypertrophication association.

Citation 287

MAHONEY, JOHN B. , JOHN J. A. MCLAUGHLIN

National Marine Fisheries Service, Northeast Fisheries Center, Sandy Hook Lab., Highlands, NJ

Salinity Influence on the Ecology of Phytoflagellate Blooms in Lower New York Bay and Adjacent Waters

J exp mar Biol Ecol

1979,37,213-223.

English

The possible role of salinity in phytoflagellate blooms in New York Harbor estuarine and oceanic waters was examined by culture studies of the dominant species. Massartia rotundata (Lohmann) Schiller (=Katodinium rotundatum (Lohmann) Loeblich III) grew best in the range 24-30 o/oo, Olisthodiscus lutens Carter in the range 10-36 o/oo, and Prorocentrum micans Ehrenberg in the range 27-36 o/oo. The optimum ranges for all three species sufficiently match the characteristic bay ocean range (17-32 o/oo) to eliminate salinity tolerance as a major factor in bloom development. Laboratory simulation of the change from brackish-river to ocean water salinities, by culture preconditioning at 20 o/oo or at 30 o/oo before inoculation into a salinity gradient, shows stress effects on growth, especially in Massartia rotundata and Olisthodiscus lutens. It is speculated that salinity stress may temporarily affect the development of particulate blooms of these two species.

Citation 288

MALONE, THOMAS C.

Inst. Mar. Atmos. Sci. , City Univ. New York, N Y

Environmental Regulation of Phytoplankton Productivity in the Lower Hudson Estuary

Estuarine Coastal Mar Sci

1977 , 5(2),157-71.

English

Phytoplankton productivity and mean photic zone chlorophyll a concentrations ranged from 0.01 g C m-2 d-1 (December) to 2.22 g C m-2 d-1 (July) and from 0.8 ug Chl 1-1 (December) to 6.4 ug Chl 1-1 (July). , respectively. Dissolved inorganic nutrient concentrations were high throughout the year, and (with the possible exception of silicate during the summer) temporal variations were not correlated with concurrent variations in phytoplankton productivity. Chlorophyll a specific phytoplankton productivity was regulated by light and temperature. Nanoplankton growth accounted for increases in phytoplankton productivity above 0.25 g C m-2 d-1 within the lower estuary. Except during the summer when phytoplankton growth rates were high, increases in phytoplankton biomass were related to the advection of phytoplankton into the lower Hudson Estuary from Raritan Bay or the Apex of the New York Bight. Although major nutrient concentrations were consistently high, net plankton growth rates were apparently less than flushing rates and, therefore, too low to generate blooms in the lower estuary.

Citation 289

MARKS, JAMES W. , ORTERIO VILLA, JR.

US Environmental Protection Agency, Annapolis, MD, Water Quality Office

Nutrient Data on Sediment Samples of the Potomac Estuary, 1966-1968

Chesapeake Technical Support Lab

1970, Data Rep. 11,20p.

English

During the years of 1966 through 1968 the Chesapeake Technical Support Laboratory, conducted three separate surveys of the bottom sediments of the tidal portion of the Potomac River to determine the existing quality of the river bottom. The results of these investigations are presented and the sampling procedures and analytical methods are described. In 1966 the Potomac River between the 14th Street Bridge in Washington, DC to the US Route 301 Bridge near Morgantown, Maryland, was sampled three times, March-May, June-August and September-October. In 1967 the same portion of the river was sampled twice, March-April and again during September. In 1968 the river between the US Route 301 Bridge to the mouth of the river at Point Lookout was sampled once during February. The parameters measured include total phosphorus, inorganic phosphorus, total nitrogen, ammonia nitrogen, chemical oxygen demand, wet weight, dry weight, volatile weight and chlorophyll a.

Citation 290

MARTIN-BOUYER, G. , H. VEIGA-PIRES, G. SALAMA, J. P. BECHAC, F. ROGER

Evaluation of Surface Water Pollution at Several Points in Relation to Zones of Shellfish Industry in Roadsteads of the Brest Region

Rev Int Oceanogr Med

1973,31/32,91-121.

French

Water samples (258) were studied, considering the following 10 parameters: coliforms, Escherichia coli, enterococci, temperature, pH, salinity, nitrites, organic matter, dissolved oxygen and BOD5 (biochemical oxygen demand). The levels of organic and bacteriological pollution were almost constant through the week. The tide had no influence on the pollution indicators, only on the salinity. Organic pollution depended on the location of the sampling stations. Fecal pollution followed almost the same pattern as organic pollution: Landerneau had the highest pollution level, Eaon the lowest. Both organic and fecal pollution were strongly influenced by the seasons; the level of organic pollution was always higher in June-July; the 3 bacteriological tests indicated a variation of fecal pollution according to the seasons, but each test gave different results.

Citation 291

MASSMANN, WILLIAM H.

The Fishes-A Neglected Aspect of Estuarine Research

Trans N Am Wildl Nat Resour Conf

1964(Mar),29,337-352.

English

The author states that the bulk of marine sport fish of the Atlantic and Gulf coast are dependent on estuaries for either spawning, nursery, or feeding grounds, but there has been little research on the management of estuarine fishes. Striped Bass and Atlantic Shad research has uncovered basic information, but most questions regarding management remained unanswered. Further detailed life history, ecological and behavior studies, information on fish population dynamics are needed for important estuarine dependent coastal fishes (flounders, weakfish, spotted seatrout and others). Information is also needed on effects on environmental factors and engineering structures on fish populations. Basic studies on the fishes of estuaries should ultimately result in methods for minimizing or compensating for damage to these waters. The use of artificial reefs by sport fishes needs to be clearly evaluated. Catch regulations where needed should be based on the results of biological studies, and their effects should be thoroughly evaluated.

Citation 292

MATHIS, JANE H.

Florida State Univ. , Tallahassee, FL, Marine Lab

Mangrove Decomposition. A Pathway for Heavy Metal Enrichment in Everglades Estuaries. Appendix III

Florida State Univ. , Tallahassee, Marine Lab.

1973 (Mar),68p.

English

Red mangrove decomposition was studied as a natural pathway for heavy metal enrichment in estuaries of South Florida. Red mangrove leaves, major constituents of the highly organic suspended detritus of the estuaries, were analyzed in several decomposition stages for heavy metal concentration. Analysis revealed a 3 to 200-fold enrichment of Fe, Mn, Cu, and Cd in the detritus compared to living leaves. This enrichment process is thought to be primarily due to adsorption, complexion and concentration of dissolved metals by the mangrove detritus and its associated microbiota. Comparisons between the Barron River estuary, which receives its drainage from agriculturally developed areas, and the Shark and Broad River estuaries, which receive drainage from undeveloped areas, revealed a significantly higher concentration of Cu and Cd in Barron River leaves and a higher concentration of Mn, Fe, and Cu in Barron River detritus than in the leaves and detritus of the uncontaminated estuaries. (Modified author abstract)

Citation 293

MATISOFF, G. , O. P. BRICKER, G. R. HOLDREN, P. KAERK

Johns Hopkins Univ. , Baltimore, MD

Spatial and Temporal Variations in the Interstitial Water Chemistry of Chesapeake Bay Sediments

Johns Hopkins Univ.

undated, Rep. CONF-750410-7,16p.

English

Core analyses to calculate the chemical mass balance relations in estuaries based on spatial and temporal variability of the concentrations of dissolved species in the sediment, and their interactions, are described. Data reliability is contingent upon navigational accuracy which limits relocation of sample sites and variations in temperature, salinity, and sediment deposition rates, which are dependent on time cycles, and which, in turn, influence both the biological and inorganic processes taking place within the cores. The oxidation reduction potential, hydrogen ion concentration, chloride, silicate, sulfate, carbonate alkalinity, ammonia, phosphate, iron and manganese were calculated and compared to the analytical techniques. The spatial variations were only slightly greater than the limits set by the analytical techniques. However, groundwater infiltration can severely affect the interstitial water chemistry and may be an important influence in some areas; also the distribution of some chemical species is controlled by local mineral equilibria, which decreases the reproducibility of spatial data. Temporal variations greatly exceeded the limits of spatial variations for each chemical specie. For parameters which are conservative and/or influenced predominantly by inorganic activity, seasonal changes in salinity and temperature control the interstitial water profiles. Those species which are involved in the decomposition of organic matter also showed a gross seasonal correlation.

Citation 294

MATTHEWS, P. J.

Anglian Water Authority, Huntingdon (England) Directorate of Scientific Services

Application of Physico-Chemical Treatment as a Method of Achieving Partial Standards on Sewage Effluents Discharged in Estuarial and Coastal Situations

Public Health Eng

1977(Mar),5(2),31-37.

English

Applying various physico-chemical treatment (PCT) methods to wastes which would be discharged to estuaries and coastal waters in England was considered. PCT was used in the nineteenth century, but biological treatment outweighed it by appearing more effective and by producing a more easily disposable sludge. Chemically aided sedimentation can be of use, however, where there is a solids standard of 60 to 150 milligrams/liter of suspended solids, or where this standard and a BOD and/or a COD limit are appropriate. The most common systems of chemical sedimentation include lime, ferric and ferrous salts, alum alone or with anionic polyelectrolytes, and cationic polyelectrolytes. This can be added before wastes undergo flocculation chamber followed by sedimentation tank treatment, or before combined flocculation/sedimentation tank treatment. The sludges produced are less filterable than primary sludges, but they can be treated, disposed of, or used in agriculture. Lime seems to be the most cost effective coagulant/flocculant. Partial treatment allows for shorter effluent pipelines than needed for crude sewage outfalls. Higher hydraulic loadings permit reduced sedimentation tank size and reduced sedimentation capital costs. The drawbacks to lime treatment are possible increases in capital costs by as much as 200% and in operating costs by 10-20% over sedimentation costs. Finally, the effects of coagulants, flocculants, and their impurities on effluent quality and sludge production must be considered.

Citation 295

MAYZAUD, P. , S. TAGUCHI

Biochimie Marine, Station Zoologique, Villegranche-sur-Mer,
06230, France

Spectral and Biochemical Characteristics of the Particulate Matter in Bedford Basin

J Fish Res Board Can

1979,36,211-218.

English

A survey of the distribution, nature, and biochemical composition of particulate matter (less than 153 um diam) showed that small particles (<18 um) made up the bulk of the particulate matter during most of the summer. Relatively large amounts of microzooplankton (tintinnids) were also recorded during the period of stable hydrographic conditions. Diatoms and dinoflagellates were abundant only in early fall prior to the fall bloom. All cell counts were transformed into parts per million on a volume basis to compare with Coulter Counter data. Cell counts on preserved samples strongly underestimated the number and volume of small particles and did not take into account the detritus. Considerations of the ATP content strongly suggested that for naturally occurring particulate matter there is not a constant ATP to carbon ratio but rather an upper and lower limit. Small particles were the main repository for protein whereas phytoplankton was the repository for carbohydrates. The high variability of both quality and quantity of particles in the neritic habitat suggests that a single chemical variable cannot describe fully the nutritive value of naturally occurring suspended matter.

Citation 296

MCCARTHY, J. J. , W. ROWLAND TAYLOR, M. E. LOFTUS

Chesapeake Bay Institute, The Johns Hopkins University;
Baltimore, MD

Significance of Nanoplankton in the Chesapeake Bay Estuary and Problems Associated with the Measurement of Nanoplankton Productivity

Mar Biol

1974,24,7-16.

English

Over a 2-year program of monthly cruises covering the entire Chesapeake Bay (USA), the phytoplankters which passed 35 um mesh were responsible for 89.6% of the phytoplankton productivity. On a single summer cruise, the <35 um phytoplankton fraction was responsible for 93.4% of the chlorophyll a and 100% of the primary productivity. The <10 um fraction was responsible for 81.3% of the chlorophyll a and 94% of the productivity. The difference in biomass in the <35 um and the <10 um fractions was significant (P = 0.025), but no significant difference in the productivity could be demonstrated. Laboratory experiments demonstrated that recently assimilated carbon can be lost with gravity screening. Considering both this and the effect of herbivorous zooplankters enclosed in productivity incubations, a prescreening rather than postscreening technique is recommended for studying nanoplankton productivity.

Citation 297

MCCARTHY, JAMES J. , W. R. TAYLOR, J. L. TAFT

Department of Biology, Harvard University, Cambridge, MA 02138

The Dynamics of Nitrogen and Phosphorus Cycling in the Open Waters of the Chesapeake Bay

Marine Chemistry in the Coastal Environment. American Chemical Society. Edited by Thomas A. Church

1975,40,644-681.

English

At the present time the greatest uncertainty in the nitrogen and phosphorus budgets of the main body of the Chesapeake Bay rests with the question of local nutrient supply. In general neither vertical transport from the sediments nor rainfall (unpublished data) can be considered as major sources. A large body of data provide both direct and indirect evidence which suggests that herbiverous zooplankters are capable of consuming the phytoplankton productivity. The smaller the zooplankton, the greater the fractional return of ingested nitrogen and phosphorus to the water via excretion. We are in the process of evaluating the importance of this pathway to local nutrient replenishment in the Bay. Bacteria in the water column, whether free-living or associated with larger particles, may in part be responsible for both supply and loss of the plant nutrients discussed above. Unfortunately, it is extremely difficult to quantitate with even fair accuracy the role of the bacteria, and the significance of bacterial activity in these processes has not been evaluated for any large area of the open Bay. Indirect evidence suggests, however, that the role of bacteria is minor when compared to those of both phytoplankton and zooplankton. The general impression from this presentation is that plankton nutrition must be viewed as a dynamic process. One can be totally deceived in an effort to understand plankton nutrition solely from measurements of biomass and nutrient concentrations, and, therefore, unless one partitions the nutrient pool and actually measures rates of utilization, little useful information can be obtained from field programs designed to investigate various links in the nutrient-phytoplankton-zooplankton-nutrient cycle.

Citation 298

MCCARTHY, JAMES J. , W. ROWLAND TAYLOR, JAY L. TAFT

Department of Biology, Harvard University, Cambridge, MA 02138

Nitrogenous Nutrition of the Plankton in the Chesapeake Bay. 1. Nutrient Availability and Phytoplankton Preferences

Limnol Oceanogr

1977(Nov),22(6),996-1011.

English

Eight stations in the main body of Chesapeake Bay and one on the continental shelf were sampled seven times over a period of 13 months to investigate the nitrogenous nutrition of the phytoplankton. The rates at which the phytoplankton were utilizing NO3-, NO2-, NH4+ and urea N were determined. The data demonstrate that for a large portion of the year there is inadequate N nutrient available to permit a single doubling of the particulate N. Over temperatures from 4-28 C and salinities from 2-32 o/oo, there was a universally high phytoplankton preference for NH4+ and urea N over NO3- and NO2-. A relative preference index indicated that NH4+ concentrations in excess of 0.5-1.0 ug-atom N liter-1 almost totally suppressed NO3- utilization. Urea N was used after NH4+ in order of preference, and when the sum of available NH4+ and urea N was insufficient to meet the phytoplankton N nutrient demand, NO3- was used. When the sum of all available N nutrients was less than that required to satiate the phytoplankton demand, NH4+, urea N, NO3-, and NO2- were all utilized at rates proportional to their availability. For the midbay region in October 1973, NO2- was the dominant N nutrient present both in the water and in the diet of the phytoplankton.

Citation 299

MCCARTY, PERRY L.

Civil Engineering Department, Stanford University, Palo Alto, CA

Energetics of Organic Matter Degradation

In: Water Pollution Microbiology. Edited by Ralph Mitchell. Wiley-Interscience

1972, Chapt. 5,91-117.

English

Natural aquatic systems are dynamic in nature and have energy flowing through them. The flow of energy gives rise to and maintains some order in the system. When the energy flux through an aquatic system remains nearly constant with time, the system will approach a steady-state condition which is kept away from a state of equilibrium by the flux of energy and the ordering which results. For this reason the concentrations of materials present cannot be determined from equilibrium calculations alone. The dynamics of the biological and physical processes occurring must also be considered. In this chapter the energetics and kinetics of bacterial growth and substrate utilization in natural aquatic systems are discussed. Bacterial growth occurs at the expense of energy released by the flow of electrons from donors to acceptors mediated by bacteria. However, bacteria are open systems in which irreversible processes are occurring and only a portion of the free energy released can be captured for useful work. The remainder escapes as heat. The extent to which bacterial growth occurs is a function of the energy released by the electron transfer and the efficiency of energy utilization by the organism mediating the transfer. Those organisms which can bring about the transfer most rapidly and can capture released energy most efficiently in a given environment will tend to dominate as their rate of growth will be greatest. The concentrations of electron donors and acceptors resulting under steady-state conditions will be governed to a large extent by the dynamics of the processes of biological growth and decay.

Citation 300

MCCORMICK, J. MICHAEL, PATRICIA T. QUINN

Biology Department, Montclair State College, Upper Montclair, NJ 07043

Phytoplankton Diversity and Chlorophyll-a in a Polluted Estuary

Mar Pollut Bull

1975(July),6(7),105-106.

English

The quantity of phytoplankton in Newark Bay, New Jersey as indicated by chlorophyll-a content of the water, is low in the winter and early spring, and fluctuates greatly during the spring and summer. Chlorophyll-a concentrations are generally less than 20 ug/l until April. Between April and August, three phytoplankton blooms were indicated by chlorophyll-a concentrations as high as 81.4 ug/l. Net phytoplankton diversity values indicated generally eutrophic conditions; however, there was no significant correlation between diversity and chlorophyll-a concentrations. A role of nannoplankton in blooms is indicated.

Citation 301

MCKEWEN, T. D.

Maryland Environmental Service, Annapolis, MD

Human Wastes and the Chesapeake Bay

J Wash Acad Sci

1972,62(2),157-160.

English

Chesapeake Bay is considered to be a relatively clean body of water, but with the population increase expected, public awareness and additional treatment is needed to improve the existing quality. Sewage and industrial waste, currently treated to remove BOD are the main contributors. Tertiary treatment to remove nutrients will soon be needed to protect the fisheries from overenrichment. With improved treatment of sewage and industrial wastes, surface runoff will become more visible. These pollutants are similar in nature to sewage but are difficult to treat because of their diffuse nature. Sedimentation originally a natural process, has been carelessly enhanced to the point of clogging backwaters of the bay. These diffuse pollutants will be the limiting factor in water quality as point source pollutants are controlled.

Citation 302

MCLEAY, D. J. , C. C. WALDEN, J. R. MUNRO

Division of Applied Biology, B. C. Research, Vancouver, V6S 2L2, Canada

Effect of pH on Toxicity of Kraft Pulp and Paper Mill Effluent to Salmonid Fish in Fresh and Seawater

Water Res

1979,13,249-254.

English

In freshwater bioassays with juvenile rainbow trout (Salmo gairdneri), at initial pH values from 4 to 11, kraft mill effluents were considerably less toxic at pH 9-10 than at neutrality. When pH of test solutions was controlled throughout the bioassay period, the least toxic range was 8.5-9.5. Toxicity at typical receiving-water pH values was 50-60% greater. The acute toxicity of effluent samples to yearling coho salmon (Oncorhynchus kisutch) was identical for these effluents in seawater and freshwater respectively, provided that the pH was adjusted and held at the same value, and that test fish were previously acclimated to the dilution water for several months. Thus seawater constituents other than pH did not affect the acute toxicity of pulp and paper mill effluents appreciably.

Citation 303

MIHNEA, P. E.

Consiliul Natl. Pentru Stiinta si Tehnologie, Sectorul 1, Bucarest, Roumania

Domestic Wastewater Effects on Marine Phytoplanktonic Algae

Rev Int Oceanogr Med

1978,49(3),89-98.

French

Two of the main trophic ions (N-NO3 and P-PO4) as well as natural phytoplanktonic communities were analyzed throughout the last 15 years along the Romanian Black Sea coast, have been investigated. Concentrations over 17 mg P-PO4,100 mg N NO3/m3, and an average of 1 million cells/l of unicellular algae could be considered as a certain diagnosis of eutrophication. The trophic importance of sewage for some algae has been experimentally proved. Chaetoceros simplex var. calcitrans was considered as an indicator organism.

Citation 304

MIHURSKY, J. A. , D. A. FLEMER, D. H. HAMILTON, JR. , C. W. KEEFE

Maryland Univ. , Solomons, MD, Natural Resources Inst.

The Effects of Thermal Loading and Water Quality on Estuarine Primary Production

NRI Maryland

1971(Oct), Completion Rep. OWRR-B-010 MD(1),55p.

English

A study was made of the effects of thermal pollution on hydrography, nutrients, phytoplankton standing crop, and primary production in the Patuxent estuary (Maryland) from September 1970 to June 1971. Residual chlorine from the water passing through the condensers of the Chalk Point Power Plant reduces phytoplankton production in the effluent canal to a greater extent than would be expected from simple mixing of condenser water with augmentation water. Nutrient concentrations in Western Branch were higher during this study year than during the previous years. Also, standing crop and primary production in the lower study area were higher during the winter of this study year than during the previous winters. Measurements of sedimentary carbon, nitrogen and phosphorus indicate great depositions of phosphorus in the sediments from Lower Marlboro to Hollowing Point.

Citation 305

MILLER, B. S. , B. B. MCCAIN, R. C. WINGERT, S. F. BORTON, K. V. PIERCE

Washington Univ. , Seattle, Fisheries Research Inst.

Ecological and Disease Studies of Demersal Fishes in Puget Sound near Metro-Operated Sewage Treatment Plants and in the Duwamish River

Puget Sound Interim Studies, Municipality of Metropolitan Seattle

1977, Final Rep. No. CR2231,164p.

English

The effects of sewage effluent on demersal fish community structure and the relationship between sewage outfalls and disease incidence and parasite infestation levels were investigated. Baseline data for future sewage treatment procedures analysis on demersal fish was collected. A sampling program was designed to collect data on species composition, distribution, and abundance as well as disease and parasite incidences in the vicinity of two sewage outfalls and a control site. The Duwamish River study provided data on the spatial and temporal distribution of tumor-bearing and parasitized flatfishes in particular starry flounder. Additional data were gathered on the distribution and abundance of all non-flatfish species.

Citation 306

MINAS, H-J. , P. DAVID, B. COSTE, M-C. BONIN, M. MINAS

Centre Universitaire de Luminy, Station Marine D'Endoume, Laboratoire D'Oceanographie, F13288 Marseille Cedex 2, FR

Caractere Particulier du Mecanisme de L'Eutrophisation dans L'Etang de Berre

Institut Oceanographique, Paris. Annales

1976,52(2),153-164.

French

Citation 307

MINAS, M.

Centre Univ. de Luminy, Marseille, France

Dissolved Oxygen and Saturation in an Environment of High

Organic Production (Etang de Berre): Role of Halocline on Distribution of These and on the Oxygen-Phosphate Ratio

Hydrobiol

1976,51(2),149-162.

French

The evolution of O2 distribution (concentration and saturation) was monitored in brackish waters of the lake Etang de Berre during several years. In relation to the occurrence of a well-defined pycnocline (halocline) an oxycline is shown to be present, leading to anoxic conditions in some cases. The relationships between O2 and nutrients under conditions of O2 depletion are examined and it is shown that anomalies are due to the dynamic aspects of the consumption-production-regeneration system. A concept of the theoretical O2 budget in a brackish water basin is proposed.

Citation 308

MOOK, W. G. , B. K. S. KOENE

Groningen Rijksuniversiteit (Netherlands), Environmental Isotopes Lab

Chemistry of Dissolved Inorganic Carbon in Estuarine and Coastal Brackish Waters

Estuarine Coast Mar Sci

1975,3(3),325-336.

English

When fresh and sea water are mixed, chemical rearrangement occurs in the dissociation equilibria. The shifts are complex, and the first and second dissociation constants are functions of ion activities which depend on the water's ionic strength and composition. Fresh waters are considered dilute solutions, but the salt content of sea water affects activity coefficients more than is theoretically predicted due to formation of ion pairs and complexes. When fresh and sea waters are mixed, acidity shows a maximum (pH minimum) at a specific mixing ratio. The first and second apparent dissociation constants of carbonic acid increases rapidly with increased salinity, causing a remarkable pH distribution in an estuary. Downstream, instead of gradual continuous increases in pH from fresh water (7.0-7.5) to ocean values (8.2), the pH showed minimal values at low salinity. Depending on the alkalinity ratio of fresh river water and sea water, estuarine carbonate ion concentrations could remain very low up to relatively high salinities and may affect shell growth of some mollusks. To obtain dissociation constants for brackish waters with low chlorinities, adjustments of data for pure water and sea water are made by mathematical equations.

Citation 309

MOORE, D. M.

Marine Sciences Centre, McGill University, Montreal, Canada

Seasonal Changes in Distribution of Intertidal Macrofauna in the Lower Mersey Estuary, U. K.

Estuarine Coastal Mar Sci

1978,7,117-125.

English

The distribution of intertidal macrofauna on the east shore of the Mersey Estuary changes from season to season. Principal components analysis identified a faunal gradient in winter which is oriented partly long-shore and partly down-shore. This pattern is simplified in spring and summer when distribution is graded everywhere perpendicular to the shore but this break down in autumn with the return of a long-shore gradient. The continual re-adjustment of the intertidal community is related to the seasonal change in the proportion of very fine sand and mud. The physical properties of the estuary which determine turbidity and sedimentation on the east shore are discussed with regard particularly to organic pollution associated with the sediment.

Citation 310

MORAITOU-APOSTOLOPOULOU, M. , V. KIORTSIS

Athens Univ. (Greece), Zoological Lab and Museum

Comparative Study of Cladocera from the 1st Meter of Sea Water, Collected in a Polluted Zone and in Another Relatively Clean Zone

Rev Int Oceanogr Med

1976,43,37-46.

French

A comparative study of the most superficial (0-100 cm layer) cladocerans was made, to assess the influence of marine pollution on their occurrence and distribution. Two collecting stations were established in the coastal waters of Saronicos gulf near Athens (Greece). One was in a polluted area near the main sewage outfall, the other in an area of purer waters. Statistically significant differences in water temperature and in the occurrence and abundance of various cladoceran species were observed between the 2 stations. In addition to their usual vertical microdistribution and seasonal variation, a preference of some of the species (Evadne spinifera) for clear vs. polluted water (E. tergestina and Podon polyphymoides) was noted. The ecological characteristics of the 6 spp. examined were analyzed in comparison with recently published data on this group. (The other 3 spp. are E. nordmani, P. intermedius and Penilia avirostris).

Citation 311

MORRIS, A. W. , R. F. C. MANTOURA, A. J. BALE, R. J. M. HOWLAND

Institute for Marine Environmental Research, Prospect Place, The Hoe, Plymouth, UK

Very Low Salinity Regions of Estuaries: Important Sites for Chemical and Biological Reactions

Nature

1978(Aug),274,678-680.

English

The importance of biogeochemical interactions in estuaries is widely recognised; in particular, theoretical models of estuarine speciation of trace metals and the pH-carbonate system predict that sharp changes of thermodynamic equilibrium conditions should occur at very low salinities (<1 o/oo). However, because of the limitations of conventional sampling strategies, the chemical properties of this freshwater-seawater interphase (FSI) have not been adequately characterized. Instead, the expected variability has usually been represented by a scatter of spatially and temporally unresolved data points. Over the past two years, we have carried out periodic detailed investigations of the immediate mixing of the fresh and brackish water in the Tamar Estuary, South West England and we present data here for 11 determinands which point to the FSI as being an important site for chemical and biological processes in estuaries.

Citation 312

MORTON, S. D. , R. SERNAU, P. H. DERSE

WARF Institue, Inc. , Madison, WI 53701

The Carbon Dioxide System and Eutrophication

US Environmental Protection Agency

1971, EPA Grant 16010 DXV, 72p.

English

Growth rates of the algae Chlorella, Microcystis, and Anabaena were studied with respect to carbon availability. Algae can utilize dissolved concentrations of carbon dioxide much lower than those atmospheric equilibria. Control of algal growth by sweeping the carbon dioxide out of water by aeration with air containing very low concentrations of carbon dioxide is difficult because of atmospheric replenishment of carbon dioxide. Bicarbonate is at least 50% utilized at growth rates as high as 7 mg per liter per day (dry weight). Atmospheric replenishment of carbon dioxide, without any wind mixing, can sustain growth rates of 1.5-2 mg per liter per day for depths of at least 1.7 m.

Citation 313

MOSHIRI, G. A. , W. G. CRUMPTON, D. P. BROWN, P. R. BARRINGTON, N. G. AUMEN

University of West Florida, Pensacola Dept. of Biology

Interrelationships between Certain Microorganisms and Some Aspects of Sediment-Water Nutrient Exchange in Two Bayou Estuaries, Phases I and II

WRRC Florida (Gainsville)

1976(July), Publication No. 37,45p.

English

Over a two-year period, certain aspects of nutrient exchange and regeneration were studied as related to major physical, chemical, and microbial parameters in two bayou estuaries.

Sediment to water phosphate (PO3-4) exchange was affected by dissolved oxygen concentrations in both systems, but Eh effects of oxygen depletion on PO3-4 exchange kinetics differ in the two bayous. Sediment Eh profiles follow a temporal pattern perhaps related to the bacterial activity. Glucose concentrations and uptake were monitored as related to possible sources and utilizers respectively. (Morgan-Florida)

Citation 314

MOSHIRI, G. A. , W. G. CRUMPTON, N. G. AUMEN, C. T. GAETZ, J. E. ALLEN

Water Resources Research Center, Univ. Florida, Gainsville

Water-Column and Benthic Invertebrate and Plant Associations as Affected by the Physicochemical Aspects in a Mesotrophic Bayou Estuary, Pensacola, Florida

WRRC Florida (Gainsville)

1978, WRRC-PUB-41,166p.

English

Water column samples were collected every 2 wk over a 1-yr period from 3 stations in mesotrophic Bayou Texar, Pensacola, Florida and were analyzed for NO3-, NH3, PO4---, and total organic C against a background of physical parameters. Phytoplankton and zooplankton populations present during the study period were identified and enumerated. Benthic core samples were collected to assess the macroinvertebrate populations; however, analysis indicated a paucity of organisms in general. Data were subjected to appropriate statistical analysis to indicate possible relations among aspects studied; negative correlations appeared between salinity and nitrates, between NH3 and dissolved O (at some stations), between Brachionus plicatilus and dissolved O and between Cryptophytes and dissolved O. Pos. correlations were indicated between total organic C and NH3, between Brachionus and Cryptophytes, and between Brachionus and Oithona colcarva.

Citation 315

MOSHIRI, G. A. , W. G. CRUMPTON

Univ. of West Florida, Dept. of Biology, Pensacola, FL 32504

Certain Mechanisms Affecting Water Column-to-Sediment Phosphate

Exchange in a Bayou Estuary

J Water Pollut Control Fed

1978,50(2),392-394.

English

The effect of reducing conditions on the release of phosphate (PO4-3) from the sediment-water interface in Bayou Texar was studied. In 1974-75,2 sampling regimens were followed in the mesotrophic Bayou Texar and in Mulatto Bayou, a nearby shallow, eutrophic bayou estuary. In one regimen, surface and bottom water samples were collected from 3 stations in each system and analyzed for dissolved PO4-3. In situ determinations of temperature, salinity, DO, and pH were made. The 2nd sampling regimen involved collection of sediment cores in order to investigate PO4-3 exchange as related to the redox status of the substrate. Data from the 1st sampling method show that in Mulatto Bayou, bottom water DO is consistently low (<2 mg/l), and there is a negative correlation between DO and dissolved PO4-3. As DO decreases, more and more PO4-3 is found in bottom waters, presumably because of the release of adsorbed PO4-3. In contrast, DO in Bayou Texar bottom water is seldom low (always ≥3 mg/l), and examination of data shows no significant correlation between DO and dissolved PO4-3 in this system. Dissolved water column PO4-3 showed no correlation with interface PO4-3 or Eh. Reducing conditions in Bayou Texar appear to cause the release of substantial amounts of PO4-3 from the sediment-water interface.

Citation 316

MOSHIRI, GERALD A. , ET AL.

Florida Water Resources Research Center, University of Florida

Determination of a Nitrogen-Phosphorus Budget for Bayou Texar, Pensacola, Florida

WRRC Florida

1972(Feb), Publication No. 17,27p.

English

Citation 317

MOSHIRI, GERALD A. , WILLIAM G. CRUMPTON , DEWEY A. BLAYLOCK

University of West Florida, Pensacola, FL

Algal Metabolites and Fish Kills in a Bayou Estuary: an Alternative Explanation to the Low Dissolved Oxygen Controversy. (Communication)

J Water Pollut Control Fed

1978,50,2043-2046.

English

Bayou, Texar, Pensacola, FL , is a shallow bayou estuary in which raw wastewater leaks are frequently followed by massive algal blooms and extensive fish kills. This study of phytoplankton physiological parameters purposed to determine if over-nutrification encouraged long-term phytoplankton population shifts. Four major groups of phytoplankton were found: dinoflagellates, chrysophytes, diatoms, and cryptophytes. Although no clear seasonal pattern was indicated, a noticeable long-term shift involved almost unispecific blooms of the first three groups. Declines in total phytoplankton biomass were accompanied by decreases in dissolved organics, and BOD maxima, and increases in DO minima. Although DO concentrations reached low levels on several dates, peak fish mortality occurred during a 1972 dinoflagellate bloom, in which the largest population of Gymnodinium, a dinoflagellate that produces metabolites toxic to fish, was recorded during the study period. The author suggests that algal bloom toxins may be the more important factor than DO stress in large fish kills. 5 references. Abstr. by JMB.

Citation 318

MUNDAY, J. C. , JR. , R. J. BYRNE, C. S. WELCH, H. H. GORDON, J. D. BOON, III

Virginia Inst. of Marine Science, Gloucester Point,VA

Applications of Remote Sensing to Estuarine Problems

VIMS

1975(Dec), Annual Rep. No. 3,168p.

English

A variety of siting problems for the estuaries of the lower Chesapeake Bay have been solved with cost beneficial remote sensing techniques. Principal techniques used were repetitive

1:30,000 color photography of dye-emitting buoys to map circulation patterns, and investigation of water color boundaries via color and color infrared imagery to scales of 1:120,000. Problems solved included sewage outfall siting, shoreline preservation and enhancement, oil pollution risk assessment, and protection of shellfish beds from dredge operations.

Citation 319

MURPHY, R. S. , R. F. CARLSON , D. NYQUIST, R. BRITCH

Alaska University, College Institute of Water Resources, AK

Effect of Waste Discharges into a Selt-Laden Estuary, a Case Study of Cook Inlet, AK

IWR Alaska

1972(Nov), Completion Rep. IWR-26,26p.

English

Cook Inlet, Alaska located adjacent to Anchorage, Alaska's largest population center, has received the areas raw waste discharges for five decades. A program of field measurements and data analysis was carried out to examine the effects of the raw discharge on the inlet's low temperature, silt laden, highly mixed waters. The physical characteristics studied included temperature , suspended sediments, tidal currents and tidal dispersion. Chemical characteristics included measurements of pH, DO, oxygen, salinity, and nutrients such as silica, nitrogen, and phosphorus. The biological characteristics studied were bacteria, plankton and benthic organisms. The study indicated that some pollution had occurred near the outfalls but the inlet as a whole was extremely low in all usual pollution indicators. Because of the high tidal mixing and heavy sediment concentrations the inlet water presents a very hostile environment and could easily receive additional waste loads with no detrimental effects. Additional treatment of the now primary treated water is unnecessary.

Citation 320

MURPHY, R. SAGE, ANN P. MILLER

Alaska Univ. , College Dept. of Environmental Health Engineering; and Alaska Univ. , College, Inst. of Water Resources

Waste-Induced Oxygen Uptake of an Alaskan Estuary

J San Eng Div Am Soc Civ Eng

1968,94(SA 2),345-354.

English

A study is reported to determine the possible biological effects of sewage discharge generated by Anchorage, Alaska, upon the waters Knik Arm, a portion of Cook Inlet, to determine optimum disposal method. Large quantities of fine silt and low ambient temperatures of Knik Arm made standard biochemical oxygen demand (BOD) procedure inappropriate as a method for predicting the biological activity of the waters. Natural waters and 2C incubation temperatures were substituted for standard BOD procedure and comparisons with standard BOD values made. At 2C incubation temperature, figures are presented which compare oxygen uptake between waters inoculated with settled sewage, and oxygen consumption by selectively removing sewage or natural water-originating organisms. Considerable oxygen uptake is observed in waters when incubation temperature is 2C. A mixture of sewage and natural water exhibits much greater oxygen consumption than natural water alone. The concentration of silt does not have an appreciable effect upon oxygen consumption. Organisms indigenous to the natural waters have greater effect on decomposition of sewage than sewage-originating organisms.

Citation 321

NAJARIAN, T. O. , D. R. F. HARLEMAN

Resource Analysis, Inc. , Cambridge, MA

Real Time Simulation of Nitrogen Cycle in an Estuary

J Environ Eng Div Am Soc Civ Eng

1977(Aug),103(EEH),523-538.

English

Biogeochemical engineering models as applied to water quality control in rivers and estuaries are discussed. Hydrodynamic aspects of an estuary are the transport processes--including the advection, mixing, and dispersion of specific constituents in waste effluents, which are in turn subject to various transformation or reaction processes. Using an idealized estuary, the coupling of transport processes in an advective system with the biochemical nitrogen transformation processes is investigated. It is shown that the predicted concentrations of the nitrogen storage variables are highly sensitive to the representation of the real time (ie, intratidal cycle) tidal motion and dispersive mixing processes within the estuary. The estuary is assumed to have uniform depth length and width and Manning roughness of 0.018. A constant freshwater inflow rate of 28 cu m/sec enters the head of the estuary, and two waste treatment plants are located on the estuary. It is demonstrated that there is a high degree of coupling between intratidal cycle transport and mixing and biochemical transfer processes in estuaries. Use of nontidal or through-flow water quality models, which grossly simplify the transport, leads to large differences in predicted nutrient concentrations, even though identical biochemical components and rate constants are used in both these and real-time models.

Citation 322

NAKAYAMA, OOKI, MASAO OHNO, TAKAJI YASUI

Dept. of Environmental Engineering, Yamanashi University, Kofu, 400 Japan

Effect of Enrichment with Digested Night Soil on the Growth of Marine Plankton

Bull Jpn Soc Sci Fish

1978,44(10),1099-1103.

Japan

Enhancement of algal growth and accompanied organisms after fertilization with night soil digested by facultatively anaerobic process was estimated through indoor and outdoor experiments. Seawater enriched with various amounts of digested night soil was inoculated with Nitzschia closterium or mixed population of natural phytoplankton and incubated at 20 C under 6,000 lx illumination for 12 hours per day during 4 weeks. Growth of Nitzschia and natural plankton especially green flagellates were much stimulated by adding 5-20 ml/l and 5 ml/l of night soil, respectively. A floating box made of PVC filled with 100 l of natural seawater enriched with 1 liter of digested night soil was placed on the water surface of Uranouchi-Bay, Pacific coast of Kochi prefecture, Japan, for 4 weeks during January to February, 1978. Water temperature was about 13 C. Population of plankton and soluble trophic elements were surveyed every week. Planktonic diatoms, which dominated in the original seawater, were overcome by such unicellular green algae as Platymonas and Chlamydomonas. Some filamentous and coccoid blue-greens and ciliates also propagated. Content of chlorophyll a increased from 2.5 to 43 ug/l, and soluble PO4-P decreased from 10 to 0.5 ug/l, after 4 weeks.

Citation 323

NAQUI, S. W. A. , S. N. DE SOUZA, C. V. G. REDDY

Relationship between Nutrients and Dissolved Oxygen with Special Reference to Water Masses in Western Bay of Bengal

Indian J Mar Sci

1978(Mar),7(1),15-17.

English

Citation 324

NARKIS, N. , M. REBHUN , CH. SHEINDORF

Environmental Engineering Laboratories, Technion, Israel Institute of Technology, Haifa, Israel

Denitrification at Various Carbon to Nitrogen Ratios

Water Res

1979,13(1),93-98.

English

The aim of this research was to examine whether the residual dissolved organic matter remaining in chemically treated sewage would be able to satisfy the carbon demand in a denitrification process. In the first stage of research we investigated the effect of type and amount of organic substrate on denitrification efficiency. The critical weight ratios of methanol and sodium acetate to total concentration of nitrite and nitrate which enable the occurrence of complete denitrification were studied. It was found that when the concentration of the organic matter was expressed as BOD, a critical ratio of (mg BOD/mg sum of NOx-N)=2.3 ensured 100% denitrification. Lower ratios decreased denitrification efficiencies proportionally. The same critical ratio was found when the chemically treated raw sewage was used as an available organic carbon source. Denitrification-nitrification process was also investigated by recirculating the nitrified effluent into the denitrification reactor, to which effluents from chemical treatment of raw sewage were fed to satisfy the carbon demand. The same critical ratio of (BOD/sum of NOx-N)=2.3 was found. By increasing the recycling, nitrate concentration in effluent was decreased.

Citation 325

NATIONAL ACADEMY OF SCIENCES

Washington, D. C.

Beneficial Modifications of the Marine Environment; Proceedings

National Academy of Sciences

1972 (July),123p.

English

The report, the proceedings of a symposium held at the Research Council's Eleventh Annual Meeting, contains papers and discussions on four imaginative proposals for modification of the marine environment. Each proposal is followed by discussions, thus assuring a balanced view of both scientific feasibility and desirability. The four topics are: Ice on the ocean and world climate; Atmospheric moisture extraction over the ocean; Water transfers: possible de -eutrophication of the Great Lakes; and Modification and management of water flow in estuaries.

Citation 326

NEDWELL, D. B.

Univ. of Essex, Dept. of Biology, Wivenhoe Park, ;
Colchester CO4 3SQ, Eng.

Inorganic Nitrogen Metabolism in a Eutrophicated Tropical Mangrove Estuary

Water Res

1975(Feb),9(2),221-231.

English

Treated sewage effluent was investigated to determine the fate of inorganic nitrogen compounds discharged into a tropical mangrove estuary. Primary production in the water column occurred at the expense of ammonium, and nitrate was only utilized during dissimilatory nitrate reduction by the sedimentary bacteria. The denitrifying capacity of mangrove sediments may make lagooning of secondary sewage effluent in mangrove areas an economical tertiary treatment process to alleviate coastal eutrophication in the tropics. (3 diagrams, 4 graphs, 1 map, 22 references, 4 tables)

Citation 327

NEILSON, BRUCE J.

Virginia Institute of Marine Science, Gloucester Point, VA 23062

Final Report on Water Quality in the Hampton Roads 208 Study Area

Appl Mar Sci Ocean Eng

1978(Mar), Special Rep. No. 171,51p.

English

The purpose of the Hampton Roads 208 Study is to assess the present and future water quality conditions in the study area and to develop a wastewater management plan to achieve certain water quality goals. The study included all major estuaries in the area, and among other things, took account of population and industrial growth, effluent quality (as mandated by PL92-500) and nonpoint sources of pollution. Land use maps for 1975, estimates of future land use, population projections and many other elements of the study initiated in 1974 provided the foundation upon which the water quality work was based. Projections of point source discharges, both flows and pollutant loads, were developed by Betz-Converse-Murdoch, Inc. (Task Package 4). The studies of nonpoint sources of pollution were conducted primarily by Malcolm Pirnie Engineers, Inc. (Task Package 5). Twenty-five sites in the two planning districts were sampled during each of two rain events by VIMS during the period March through October 1976. Data from these field studies were used by MPEI to calibrate the mathematical model of surface runoff called STORM (Storm, Treatment, Overflow and Runoff Model). This model then was used to project nonpoint loads at the time of water quality surveys and for future times.

Citation 328

NELSON, B. W.

South Carolina Univ. , Columbia, SC, Coll. of Arts and Sciences

Biogeochemical Variables in Bottom Sediments of the Rappahannock River Estuary

In: Environmental Framework of Coastal Plain Estuaries; 18th Annual Meeting of Southeastern Section of the Geological Society of America, 10-11(Apr)1969, Columbia, SC

1972, Memoir 133,417-451.

English

A transition from undifferentiated mud to estuarine sediment occurs in the bottom of the Rappahannock River estuary, Virginia, between the sediment-water interface and 100 centimeters in depth. The sediment profiles and their chemical properties respond to a dynamic equilibrium between sedimentation rate, depositional rate of organic detritus, and microbiological activity. The equilibrium is influenced by the general bathymetry and intensity of physical processes near the bottom, the salinity and ventilation of the bottom water, the composition of organic detritus, and sediment compaction processes such as dewatering and gas ebullition. Below 50 centimeters in depth, Eh typically becomes positive. In the lower estuary, less intense physical process in greater water depths and high salinities cause higher rates of microbial activity. The chemical properties of estuarine sediment respond to the biological, chemical, and physical forces in their environment, and the particular expression of profile development at any location tends to reflect a dynamic equilibrium between these forces.

Citation 329

NEVILLE, R. A. , J. F. GOWER

Dept. of the Environment, Victoria (British Columbia), Inst. of Ocean Sciences

Passive Remote Sensing of Phytoplankton via Chlorophyll Alpha Florescence

J Geophys Res

1977(Aug),82(24),3487-3493.

English

The spectrum of light backscattered from the sea in the visible and near infrared and, in particular, the chlorophyll alpha fluorescence line at 685 nm were observed from an aircraft under natural illumination by using a multichannel silicon diode spectrometer. The instrument was mounted in the aircraft so as to view the water surface at the Brewster angle by using a polarizer to reduce reflected skylight substantially, even under rough surface conditions. This and the relatively high red sensitivity of the silicon diode detectors explain why the line appears here but not in previous airborne observations. The observed line height was compared with chlorophyll depth distribution measurements made from a launch and was shown to be proportional to an average of the chlorophyll concentration near the surface, weighted with depth to allow for absorption by the water of light at 685 nm. The observations were made at low (150 m) altitude, but it was shown that the observed line height is insensitive to altitude up to 1200 m. Although the lowest chlorophyll concentration encountered was 2 mg/cu m, the technique is expected to be useful for airborne mapping of chlorophyll at concentration several times smaller than this.

Citation 330

NEWBURY, T. K. , EDWIN F. BARTHOLOMEW

Univ. of Hawaii, Dept. of Oceanography, Honolulu, HA 96822

Secondary Production of Microcopepods in the Southern, Eutrophic Basin of Kaneohe Bay, Oahu, Hawaiian Islands

Pac Sci

1976,30(4),373-384.

English

The microcopepods function as an important herbivorous group in the planktonic community of the southern, sewage-rich portion of Kaneohe Bay, Oahu, Hawaiian Islands. Most of the microcopepod biomass was composed of a rapidly producing species of Paracalanidae. The Paracalanidae population production rate was calculated with the field population stage composition, the length: dry weight relationship, and the species development rate in both laboratory and in situ containers. The population production rate/biomass ratio equalled 78 percent per day during summer 1968. For all of the microcopepods secondary production was estimated to be 1.8 mg nitrogen/m3/day.

Citation 331

NICHOLS, J. A.

Southeastern Massachusetts Univ. , North Dartmouth, Dept. of Biology

Benthic Community Structure Near the Woods Hole Sewage Outfall

Int Rev Gesamten Hydrobiol

1977,62(2),235-244.

English

The benthic invertebrate fauna near the Woods Hole, Massachusetts sewage outfall and a nearby control area were sampled. Community structure in terms of numbers and taxa fluctuated seasonally at both control site and at the outfall. The outfall fauna was dominated by small nematode worms, and the year round maintenance of a nematode-dominated community may be a mechanism for utilization of the unpredictable unnatural, excess organic material available around the outfall. Based on the small size of the invertebrates at the outfall compared to the other areas, it is suggested that the relationship between macrofaunal abundance and average individual size in an assemblage is a measurement of community structure which can be useful in assessing environmental disturbance.

Citation 332

NICKELS, JANET S. , JOHN D. KING, DAVID C. WHITE

Department of Biological Science, Florida State University, Tallahassee, FL 32306

Poly-B-Hydroxybutyrate Accumulation as a Measure of Unbalanced Growth of the Estuarine Detrital Microbiota

Appl Environ Microbiol

1979(Mar),37(3),459-465.

English

The procaryotic endogenous storage material poly-B-hydroxybutyrate (PHB) can be induced to accumulate in the estuarine detrital microbiota under conditions which suggest unbalanced growth, such as limitation of a critical factor(s) in the presence of carbon and energy sources. Changes in PHB-to-lipid phosphate ratios detected in field samples can be mimicked in the laboratory with common estuarine stresses. Acute anoxia or low pH induces conditions of no growth with depression of both the synthesis and catabolism of PHB without change in the lipid phosphate. Balanced growth induced by nutrients increases the lipid phosphate, depresses PHB synthesis, and stimulates PHB catabolism, resulting in a low ratio of PHB to lipid phosphate. Unbalanced growth induced to a small extent by high salinity or much more readily by dark upland runoff water results in rapid accumulation of PHB and slowing of PHB catabolism with little change in lipid phosphate. Unbalanced growth conditions result in high PHB-to-lipid phosphate ratios in the detrital microbiota.

Citation 333

NIELL, F. X.

Laboratorio de Investigaciones Pesqueras, Muelle de Bouzas

C/N Ratio in Some Marine Macrophytes and its Possible Ecological Significance

Bot Mar

1976,19(6),347-350.

English

Carbon-nitrogen ratios determined for 24 species of benthic algae collected from intertidal rocks in Vigo Bay, northwestern Spain, showed that Phaeophyta had the highest mean values among noncalcified algae. The production rate of a given alga was inversely related to its carbon-nitrogen ratio, and older thallus parts had higher ratios than did younger parts. There was no apparent connection between the C/N ratio and the level at which an alga was growing in the intertidal zone. All collections were made in late January; plants were dried at 80C for three hours, ground to a powder, and dried again but at 100C. Samples were then analyzed in a C, N, H Perkin-Elmer 240 autoanalyzer. Carbon and nitrogen levels showed a low positive correlation value (r=0.48). Phaeophyta had a lower nitrogen content than Chlorophyta or Rhodophyta. High C/N ratios were found in all algal species dormant in the winter, such as Enteromorpha ramulosa, Sacchoriza polyschides, Laminaria ochroleuca, Cystoseira baccata, C. tamariscifolia, Fucus spiralis, Pelvetia canaliculata, Gelidium sesquipedale, G. attenuatum, and Gigartina acicularis.

Citation 334

NIELL, F. X. , Y. J. BUELA

Instituto de Investigaciones Pesqueras, Vigo (Spain), Laboratorio de Investigaciones Pesqueras

N. W. Spain, 'Stress' on the Fucaceae Standing Crop

Invest Pesq

1976,40(1),137-149.

Spanish

Populations of intertidal fucaceae in the vicinity of a Kraft pulping waste discharge in Pontevedra Bay, Spain, show the effects of pollution. There is a total abiotic zone in the immediate vicinity of the discharge; farther on, a semi-biotic zone is found; and farther distant a zone with some eutrophic population characterized by an abundance of Mytilus and Ulvales. The biomass is lower near the discharge. There is a high negative correlation between lignosulphonic residues and biomass.

Citation 335

NIEMI, AKE

Proceedings of the Third Baltic Symposium on Marine Biology. Helsinki/ Helsingfors, 11-17(June)1973

Helsinki, Government Printing Centre

1975,355p.

English

The topics chosen for this symposium are 1. Production, food webs, and ecological models of the Baltic and 2. Indicator organisms/communities of different environments in the Baltic.

Citation 336

NIENHIUS, P. H. , B. H. H. DE BREE

Delta Institute for Hydrobiological Research, Yerseke, Netherlands

Production and Ecology of Eelgrass (Zostera marina L.) in the Grevelingen Estuary, the Netherlands, Before and After the Closure

Hydrobiologia

1977,52(1),55-66.

English

The Grevelingen estuary was cut off from the North Sea and from influences of the river Rhine by a dam in 1971, and became a stagnant salt-water lake. Production and ecology of Zostera marina L. were studied in 1968 and in 1973-1975, both through standing stock estimations, biomass increases in permanent quadrats, and correlation of distribution patterns with ecological factors. After the closure of the estuary the intertidal eelgrass population extended downwards to 5 m below lake level, probably owing to the increased transparency of the water; the area occupied, and the density of the eelgrass beds increased strongly. Eelgrass annual overground production, based on doubled maximum standing crop values in July-August, was estimated at 50 g C/m2 in 1968,121 g C/m2 in 1973 and 91 g C/m2 in 1975 in Zostera beds, and 4 g C/m2 in 1968,18 g C/m2 in 1973 and 23 g C/m2 in 1975 for the entire Grevelingen area. A minimum estimate of net production in Zostera beds at a depth of 0.50-0.75 m, based on short term changes in biomass in 2 permanent quadrats in 1974 and 1975, was 40.5 g C/m2/yr for overground parts and 12.7 g C/m2/yr for underground parts. Horizontal distribution of eelgrass is not primarily limited by grainsize distribution, but more by exposure to wave action and currents. On account of irradiance reduction light is a limiting factor in the vertical distribution of the eelgrass population in Lake Grevelingen.

Citation 337

NIHOUL, J. C. J.

Hydrodynamics of Estuaries and Fjords

Elsevier; Amsterdam, Netherlands. Proceedings of 9th International Liege Colloquium on Ocean Hydrodynamics

1978, Elsevier Oceanogr. Ser. No. 23,546p.

English

Twenty-eight papers are presented, dealing with hydrodynamic modelling of estuaries, fjords, coastal seas and rivers, each of which is catalogued individually in this issue of ASFA.

Citation 338

NISHIMURA, H.

Tokyo Univ. (Japan), Dept. of Chemical Engineering

Nitrogen Cycles in a Polluted Sea Area

Chem Eng

1976(Dec),315,760-764.

English

A model is proposed for quantitative analysis of the nitrogen cycle to determine the relative importance of two terrestrial sources of organic loading to Japan's Seto Sea. This narrow inland sea, 400 km long by 40 km wide between the mainland and Shikoku Island, is a very fertile fishing ground, but 15 years of extensive urbanization and petrochemical industrialization along its shores have resulted in severe water pollution. Oil-tainted fish, red tides, and heavy fishkills have been observed, and catches of prawn, crab, and sea bream have declined to one-third previous levels. A 1974 governmental act requires reduction of chemical oxygen demand to 60% of the 1972 level. Although the fish catch of plankton feeders (such as anchovy) has increased, a substantial decrease in benthic crustacea (prawn, crab) and benthic feeders (sea bream, turbot) is attributed to pollution of bottom sediments with organic matter. Excessive organic matter in sediments is lethal to benthic organisms as it produces sulfides in sediments while reducing sulfates in the sea water. Organic loading comes from both terrestrial sources and marine plankton. Plankton growth depends on feed rates of phosphorus and nitrogen nutrients from land; these rates are therefore nearly equivalent to the organic load in the marine environment. Thus, two sources of terrestrial organic loading are present; a direct source, in the form of organics, and an indirect source, in the form of nutrients.

Citation 339

NORTH CAROLINA UNIV.

Chapel Hill, Inst. of Marine Sciences

Structure and Functioning of Estuarine Ecosystems Exposed to Treated Sewage Wastes

North Carolina Univ.

1971(Feb), Annual Rep. 1970-1971,345p.

English

This is the third annual report from an investigation of the ecological systems which develop when estuarine waters are enriched with sewage wastes. Various phases of community structure and metabolism of six experimental brackish-water ponds, three of which received treated sewage wastes, and of a small tidal creek and its salt marshes were studied. Included are chapters on productivity, carbon metabolism, the phosphorous budget, nitrogen, and bacterial heterotrophy; on the standing crops of phytoplankton, decapod crustaceans, fishes, meiofauna, foraminifera, insects, mollusks, and birds; on calcium analysis; and on growth and reproduction of algae. The wastes ponds have developed into productive, well integrated, but slightly unstable systems. They perform some of the functions of tertiary treatment and hold promise for production of harvestable seafood protein.

Citation 340

N Y OCEAN SCIENCE LAB

N Y

The Problems of Long Island Waters

N Y Ocean Science Lab, Workshop 9-11(Feb)1971

1971(Feb), Technical Rep. 0010.

English

Citation 341

O'CONNOR, DONALD J. , DOMINIC M. DI TORO, ROBERT V. THOMANN

Manhattan College, Bronx, NY

Phytoplankton Models and Eutrophication Problems

NOAA/Resources for the Future Symp. on Ecological Modeling, Wash, DC, 10-12(Sept)1974

1974, Technical Rep. , 149-160.

English

A set of equations describing the seasonal distribution of phytoplankton is applied to the analysis of eutrophication problems in various US locations. The theoretical structure of the analysis is reviewed with a qualitative description of the pertinent equations and a discussion of the general procedure of the verification process. Examples from the freshwater segment of the San Joaquin River, Calif. ; the estuarine regions of the Sacramento-San Joaquin Delta, Calif. ; the Potomac River, Washington, D. C. ; Western Lake Erie; and Lake Ontario are presented.

Citation 342

O'CONNOR, DONALD J. , ROBERT V. THOMANN, DOMINIC DI TORO

Manhattan Coll. , Bronx, N Y, Dep. of Civil Engineering

Dynamic Water Quality Forecasting and Management

US Environmental Protection Agency

1973 (Aug), Ecol Res Series EPA-6603-73-009,209p.

English

The report describes the formulation and initial verification of two modeling frameworks. The first is directed toward an analysis of the impact of the carbonaceous and nitrogenous components and wastewater on the dissolved oxygen resources of a natural water system. The second modeling framework concentrates on the interactions between the discharge of nutrient, both nitrogen and phosphorus, and the biomass of the phytoplankton and zooplankton populations which result, as well as incorporating the overall impact on dissolved oxygen. The models are formulated in terms of coupled differential equations which incorporate both the effect of transport due to tidal motion and turbulence, and the kinetics which describe the biological and chemical transformation that can occur. The modeling frameworks are applied to the Delaware and Potomac estuaries in order to estimate the ability of such models to describe the water quality effects of carbon, nitrogen, and phosphorous discharges. The agreement achieved between observation and calculation indicate that the major features of the impact of wastewater components on eutrophication phenomena can be successfully analyzed within the context of the models presented herein. (Author)

Citation 343

ODUM, H. T. , A. F. CHESNUT

Inst. of Marine Sciences, Univ. of North Carolina, Chapel Hill and Morehead City, NC

Studies of Marine Estuarine Ecosystems Developing with Treated Sewage Wastes

Inst. Marine Science, UNC

1970(May), Annual Rep. 1969-1970,366p.

English

This is the second annual report in a study of ecological systems that develop when the treated wastes from municipal sewage systems flow into estuarine waters. Studies by a team of faculty and students of the University of North Carolina are considering a small marsh-lined estuary, Calico Creek, which receives the wastes following secondary sewage treatment and a set of three ponds in which estuarine water and treated sewage mixture flows. Three control ponds receive tap water and estuarine water. Now in their second year, the ponds are rich in productivity with successive algal blooms throughout the year and a food chain culminating in blue crabs. In this report there are chapters on the events in the salinity regime and input management, photosynthetic productivity and respiration, algal growth, phosphorus and nitrogen, bacteria, and animal populations. The presence of a substantial ecological system suggests a viable intermediary system interface is possible between man's municipal wastes and normal estuaries. These systems have potential for aquaculture and waste amelioration.

Citation 344

OFFICE OF WATER RESEARCH AND TECHNOLOGY, WATER RESOURCES SCIENTIFIC INFORMATION CENTER

Washington, DC

Estuarine Pollution, A Bibliography

WRSIC

1973 (Apr), WRSIC-73-205,510p.

English

The bibliography, containing 324 abstracts and references, is another in a series of planned bibliographies in water resources to be produced from the information base comprising Selected Water Resources Abstracts (SWRA). At the time of search for this bibliography, the data base had 50,631 abstracts covering SWRA through December 15,1972. The report contains an author index and extensive subject indexes.

Citation 345

OFFICE OF WATER RESEARCH AND TECHNOLOGY, WATER RESOURCES SCIENTIFIC INFORMATION CENTER

Washington, DC

Estuarine Pollution, a Bibliography, Vol. 2

WRSIC

1976(Dec), Rep. OWRT/RSIC 76-207,576 p.

English

This report, containing 366 abstracts, is another in a series of planned bibliographies in water resources produced from the information base comprising selected water resources abstracts (SWRA). Volume 2 covers the period from January 1973 to April

1974 (Volume 7, Number 7). Author and subject indexes are included.

Citation 346

OFFICE OF WATER RESEARCH AND TECHNOLOGY, WATER RESOURCES SCIENTIFIC INFORMATION CENTER

Washington, DC

Estuarine Pollution, a Bibliography, Vol. 3

WRSIC

1976(Dec), Rep. OWRT/WRSIC 76-208,566p.

English

This report, containing 373 abstracts, is another in a series of planned bibliographies in water resources produced from the information base comprising selected water resources abstracts (SWRA). Volume 3 covers the period from April 1974 to September 1976 (Volume 9, Number 18). Author and selected indexes are included.

Citation 347

OFFICER, C. B. , J. H. RYTHER

Dartmouth College, Hanover, NH 03755 and W. H. O. I. , Woods Hole, MA 02543

The Importance of Silicon in Marine Eutrophication

Science

Submitted manuscript, 1979.

English

Diatom phytoplankton populations are the usual food for zooplankton and filter feeding fishes and contribute in a direct way to the large fishable populations in coastal zones. Flagellates, on the other hand, are frequently poor foods for most grazers and can lead to undesirable eutrophication effects. Arguments are presented that silicon is often the controling nutrient in altering a diatom to a flagellate community. The alteration is governed by the relative magnitudes of the natural fluxes of the nutrients nitrogen, phosphorus and silicon to the receiving water body and the recycled fluxes of nitrogen and phosphorus from zooplankton grazing and phytoplankton respiration and decomposition. Examples of such alterations are presented for oceanic, estuarine and inland water bodies. (author abstr.) This manuscript presents no documentation for the statement that non-diatom food is bad for the ecosystem. In contrast to this idea, American oyster larvae grow very nicely when cultured on a mixture of two flagellates and a green alga; consequently this idea needs either literature documentation or more research. The general model related to silica has merit but is perhaps self evident; value judgements related to eutrophication are perhaps premature. (comments by KLW)

Citation 348

OFFICER CHARLES B. , JOHN H. RYTHER

Dartmouth College and Woods Hole Oceanographic Inst.

Secondary Sewage Treatment Versus Ocean Outfalls: an Assessment

Science

1977(Sept),197(4308),1056.

English

Simplified models have been developed to obtain order of magnitude estimates of the oxygen demand of municipal and industrial wastes and of their potential eutrophication effects in the marine environment. The models have been applied to assess two major corrective actions that might be considered for such pollution problems: secondary sewage treatment and ocean outfalls. The assimilation characteristics of rivers, estuaries, and coastal waters are examined. The waste oxidation model and eutrophication oxidation potential are discussed. Results indicate that the arguments for secondary sewage treatment as the proper corrective action are not compelling and that the problem should be reexamined with appropriate scientific and engineering evaluations. One goal of such scientific evaluations should be a more thorough understanding of the life histories of possible trace contaminants and pathogens that may have long biological, chemical, or geological retention times in the marine environment. (1 graph, 27 references, 1 table)

Citation 349

OGITA, HARUHISA, YUKIO ARAKAWA

Aichi Environ. Res. Cent. , Nagoya, Japan

Self-Purification of Rivers and Estuaries. 2. Self - Purification and Environmental Acceptability

Aichi -Ken Kogai Chosa Senta Shoho

1976,4,42-49.

Japan

The average value of rate constants of deoxygenation in Aichi prefecture rivers was 0.1. Variations were observed among rivers or sampling stations of the same river; the observed rate constants of self-purification showed some variation depending on sampling stations and BOD, COD, total organic C, and total O demand. Secondary pollution by eutrophication should be considered as a factor influencing self-purification.

Citation 350

OHLHORST, C. W.

National Aeronautics and Space Administration, Langley Station, VA, Langley Research Center

Analysis of Six Broadband Optical Filters for Measuring Chlorophyll-a and Suspended Solids in the Patuxent River

NASA Technical Memorandum

1976(July), X-3399,49p.

English

Six broadband optical filters were flown over the Patuxent River (Maryland) in 1972 to evaluate their use in remotely measuring total chlorophyll-a and suspended solids concentrations, as part of a program to determine spectral bandwidths needed to measure remotely various water quality indicators. The spectral range of the Kodak Wratten 89B filter (690 to 900 nm) showed promise for detecting gross changes in total chlorophyll-a levels in estuarine waters. The filter-film system detected concentrations greater than 67 microgram/liter but did not detect concentrations lower than 28 microgram/liter. There was some indication that the 690 to 900 nm band can be used to measure suspended solids concentrations in the 20 to 70 mg/l range. The broad spectral bands of 500 to 600 nm (Wratten filters 57 and 58),600 to 700 nm (Wratten filter 25), and 500-700 (Wratten filter 12) do not by themselves seem capable of measuring total chlorophyll-a levels below 28 microgram/liter in turbid waters. These spectral bands ranges do show some promise in measuring the concentration of total suspended solids in the range of 20-70 microgram/liter. The spectral band of 400-500 nm (Wratten filter 47B) shows no indication of being able to measure either total chlorophyll-a (less than 28 microgram/liter) or total suspended solids (20 to 70 microgram/liter range) in turbid estuaries.

Citation 351

OKADA, MITUMASA, RYUICHI SUDO

Natl. Inst. Environ Stud. , Tsukuba, Japan

Methodology of Algal Assay Procedure and its Application to Eutrophication Research

Yosui to Haisui

1978,20(7),765-779.

Japan

Citation 352

OLSSON, L. , R. ROSENBERG, E. OLUNDH

Uppsala Univ. (Sweden), Inst. of Zoology

Benthic Fauna and Zooplankton in Some Polluted Swedish Estuaries

AMBIO

1973,2(5),158-163.

English

Four more-or-less polluted estuaries on the Swedish west coast are compared regarding bottom fauna of different sizes, and zooplankton. The salinity in these almost non-tidal waters varies from estuary to estuary and decreases from north to south. As it was expected that the physical and chemical environment in the estuarine systems might be reflected in the faunal communities, the purpose was to classify the systems in respect to each other on a faunal basis, especially with regard to the pollution aspects. The meiofauna of the bottom (size 0.1-1 mm), represented by foraminifers (one-celled animals) and annelids (segmented worms), seemed more to reflect differences in pollution than differences in salinity. A reduced ostracod fauna (crustaceans) was an outstanding feature. Few species appeared in all estuaries. Even the macrofauna of the bottom (size greater than or equal to 1 mm) showed that the effects of pollution in Byfjorden were restricted to the inner areas. In a comparison with another estuary, Saltkallefjorden, nowadays almost non-polluted and recovered, there was a remarkably uniform fauna at certain localities in the two estuaries. If distance to river-mouth is taken into consideration, both meio- and macrofaunal composition seemed to be more similar between the various estuaries than within individual estuaries, reflecting the short-distance changes of the environment. Compared to the bottom fauna, the zooplankton (greater than or equal to 0.16 mm) showed the least differences between the various estuaries. The composition seemed to be much the same, with copepods (crustaceans) as the dominating group.

Citation 353

OLUFEAGBA, B. J. , R. H. FLAKE , N. E. ARMSTRONG

Department of Electrical Engineering, University of Texas at Austin, Austin, TX

A Boundary Value Approach for Estuarine Water Quality Modelling with Results for Jamaica Bay, New York

Ecol Model

1975,1,3-30.

English

Results of water quality modelling for Jamaica Bay, a New York estuary with a large hydraulic circulation, are presented. The two-dimensional topology is approximated by a set of coupled one -dimensional subsystems. The long term steady state water quality problem is then reformulated as a multi-point boundary value problem for ordinary differential equations. Piecewise constant dispersion parameters are estimated from salinity data. A sequential algorithm based on parallel shooting is developed for solving the multi-point problem. The method, which simplifies handling of feedforward and feedback reaction kinetics, is equivalent to employing a high order finite difference technique with the subsequent enhanced accuracy. Results of model verification for uncoupled variables-salinity, coliform, total soluble phosphorus, and coupled variables for nitrogen(organic and ammonia)and BOD-DO for Jamaica Bay are discussed.

Citation 354

ORLOB, G. T.

California Univ. , Davis, CA, Dept. of Civil Engineering

Mathematical Modeling of Estuarine Ecosystems

In: Proceedings of the International Conference on Transport of Persistent Chemicals in Aquatic Ecosystems, 1-3(May)1974, Ottawa, Canada

1974(May), IV27-IV43.

English

A set of models is described which are designed to simulate hydrodynamic, hydrologic, water quality, and biologic behavior of aquatic systems of an estuarine environment. The particular set of models is applied to the San Francisco Bay Delta area. Convection-diffusion equations describe the transport of substance identified with the water mass. Knowledge of hydrodynamic behavior necessary for the solution of this equation is derived from the prototype or a model. Aquatic ecologic processes are described mathematically through the concept of conservation of mass and energy. A model for long-range simulation and another for dynamic response are described.

Citation 355

ORTH, R. J.

Virginia Inst. of Marine Science, Gloucester Point

Effect of Nutrient Enrichment on Growth of the Eelgrass Zostera marina in the Chesapeake Bay, VA

Mar Biol

1977,44(2),187-194.

English

Experimental addition of two commercial fertilizers to a bed of eelgrass (Zostera marina) in Chesapeake Bay off Church Neck, Delmarva Peninsula, Virginia, greatly increased the length, biomass, and total number of turions over controls at both shallow and deep stations during a two to three month period. Results suggest: (1) Z. marina beds in Chesapeake Bay are nutrient-limited, (2) growth form of Z. marina may be related to sediment nutrient supply, and (3) Z. marina may competitively exclude Ruppia maritima by light-shading. Fertilizers used were: (1) 5% ammonium nitrate, 10% phosphoric anhydride, 10% potassium oxide; and (2) 10% ammonium nitrate, 10% phosphoric anhydride, 10% potassium oxide. The area is characterized by an extensive intertidal sand flat populated by patchy widgeon grass (R. maritima) and grading into a mixed subtidal seagrass bed of Z. marina and R. maritima, and then into a monospecific bed of Z. marina in deeper portions. Two stations were established, Station A in 0.3 m of water, and Station B in 0.6 m of water (mean low water). No significant difference was found between the two fertilizers for any of the parameters monitored. There were significantly more turions in both fertilized plots and controls in the shallow area than in the deeper area, but turions in deep plots were significantly longer than those in shallow plots.

Citation 356

OVERSTREET, R. M. , H. D. HOWSE

Gulf Coast Research Lab. , Ocean Springs, MS

Some Parasites and Diseases of Estuarine Fishes in Polluted Habitats of Mississippi

Ann NY Acad Sci

1977(Sept),298,427-462.

English

Several diseases that afflict both finfishes and shellfishes that live in waters suspected or known to be polluted are described. Pollutants can affect animals directly by causing acute to chronic diseases or they can affect the animals indirectly by stressing them and thus allowing them to be vulnerable to parasites or other disease agents, forming synergistic or other-type relationships between the pollutant and other chemical or disease-causing agent, permitting predators to become affected by feeding on exposed animals, or destroying the environment so that the animals can no longer live, grow, or reproduce. Brief comments follow on the habitats and pollutants in Mississippi and examples of a variety of diseases and conditions that affect fishes in polluted habitats are given.

Citation 357

PALMER, C. MERVIN

Municipal Environmental Research Lab. ,
Cincinnati, OH

Algae and Water Pollution

US Environmental Protection Agency

1977(Dec), EPA-68-03-0232.

English

Algae are involved in water pollution in a number of important ways. It requires a continuous monitoring and study of algae existing in waters of various quality in order to determine what controls or what changes or what uses can be instituted for the benefit of man and for conservation of water and of desirable aquatic life. This manual presents a simplified identification key limited to algal species of importance in water supplies and associated with pollution. The most important species are illustrated in three-dimensional drawings in color. The manual also deals with the ecology and significance of algae and presents information on filter clogging and mat forming algae, attached forms, algicides and algal control, algae associated with pollution (both fresh water and estuaine), various uses of algae, algae of rivers and lakes, eutrophication, algae as indicators of pollution, methods of recording algae, and the use of algae in waste stabilization lagoons for the treatment of domestic and/or industrial wastes.

Citation 358

PAMATMAT, MARIO M. , R. STEPHEN JONES, HERBERT SANBORN,
ASHOK BNAGWAT

Dept. of Fisheries, Auburn University, Auburn, AL

Oxidation of Organic Matter in Sediments

US Environmental Protection Agency

1973(Sept), EPA-660/3-73-005.

English

Techniques were developed for sampling undisturbed sediment interface, and measuring oxygen uptake by intact sediment cores, dehydrogenase activity of sediment bacteria, and metabolic heat release by benthic organisms. Dehydrogenase activity, a relative measure of anaerobic metabolism, was calibrated by direct microcalorimetry to provide estimates of actual metabolism under field conditions. The oxygen debt of sediments was determined by a dichromate method. Laboratory experiments were conducted to determine the relationship between oxygen uptake, loss of carbon, and release of silicate, nitrate, ammonia, and phosphate by sediments. The oxygen consumption at 33 stations in Puget Sound was measured each season to provide baseline data for this estuary. The original working hypothesis, that total oxygen uptake represents a measure of total metabolism in the sediment column appears erroneous, at least in organically rich sediment where anaerobic metabolism may greatly exceed aerobic metabolism. As sedimentation rate of oxidizable organic matter increases, as in cases of organic pollution and eutrophication, anaerobic metabolism becomes an important process that is measurable by dehydrogenases assay. In less organic sediments, the rate of oxygen uptake may be a fair estimate of total metabolism. Furthermore, it is a useful index of equilibrium conditions among the various factors that affect the rate of oxygen uptake, e. g. oxygen tension, temperature, turbulence, available metabolizable energy, composition of community, etc.

Citation 359

PANSINI, M. , R. PRONZATO

Genoa Univ. (Italy, Inst. of Zoology)

Preliminary Analysis on the Distribution of Porifera in Areas Exposed to Different Types of Pollution

Boll Mus 1st Biol Univ Genova

1975,43,21-32.

Italian

The effects of several kinds of pollution on the distribution of Porifera were analyzed along the coast of Liguria (Italy), five stations on hard bottoms subjected to industrial or cloacal pollution and another from unpolluted waters were selected. The number of Porifera collected in polluted waters is lower than in unpolluted environments, but the industrial pollution seems to affect the sponge development much more than the sewage. Only 3 specimens of Calcispongiae and 2 of Demospongiae (owing to different species) were collected in polluted waters containing parts of toxic chemicals. A rather rich and varied population of Porifera (8 spp) was observed in the harbor eutrophic environment, despite the presence of considerable amounts of sewage. The numerous findings of the Demospongia Hymeniacidon sanguinca (Grant) in polluted water emphasize the interest of the study of this sponge as a possible pollution marker.

Citation 360

PARDO, J. , R. A. COLER

Univ. of Massachusetts

A Test of the Effects of Domestic Sewage on the Growth of the Common Blue Mussel, Mytilus edulis, in an Aquacultural System

Univ. of Massachusetts Water Resources Centre

1977, Publication No. 87,44p.

English

The effect of domestic sewage on the growth rate of the marine bivalve mollusc, Mytilus edulis was investigated by introducing controlled amounts of sewage into a raceway system and comparing the response with that of organisms in a similar system fed with uncontaminated estuarine water. The results showed that the admixture of domestic sewage with sea water retarded the growth of this organism, and indicate that it would not be feasible to use populations of Mytilus to reduce the BOD due to sewage sludge in receiving waters.

Citation 361

PARK. C. K.

Eutrophication and Chlorophyll Content in the Sea Water of Jinhae Bay Area Korea

Bull Korean Fish Soc

1975 , 8 (3),121-126.

English

Citation 362

PARSONS, T. R. , K. VON BTOCKEL , P. KOELLER , M. TAKAHASHI , M. R. REEVE , O. HOLM-HANSEN

Institute of Oceanography, Universty of British Columbia, B. C. , Canada

The Distribution of Organic Carbon in a Marine Planktonic Food Web Following Nutrient Enrichment

J. exp. mar. Biol. Ecol.

1977,26,235-247.

English

Low level nutrient enrichment of four enclosed water columns showed an increased production with nutrients but a decrease in transfer efficiency between primary producers and ctenophore production. From an extrapolation of primary productivity levels in the enriched containers to one unenriched container it is found that the nitrogen flux was 1.52 mg-at. N/m2/day which allows for an approximate doubling of the nitrogen supply as calculated from winter nitrate levels. A carbon budget for each container was calculated for primary, secondary, and tertiary producers; decrease in transfer efficiencies were accounted for at various points in the food web.

Citation 363

PARSONS, T. R. , R. J. LEBRASSEUR, J. D. FULTON

Fisheries Research Board of Canada, Nanaimo (British Columbia), Pacific Oceanographic Group

Some Observations on the Dependence of Zooplankton Grazing on the Cell Size and Concentration of Phytoplankton Blooms

J Oceanogr Soc Jpn

1967(Feb),23(1),10-17.

English

Authors

determined, with Coulter counter (apertures: 100 and 400 microns), size and quantity of particulate food consumed by different zooplankters during occurrence of two natural phytoplankton blooms. Individual organisms constituting Chaetoceros bloom could be readily utilized by Euphausia pacifica (EP); but Calanus pacificus (CP), Euphaussid furcilia (EF), and Pseudocalanus minutus (PM) could derive only a subsistence diet from same plants. Unidentified nannoplankters, about 8 microns diameter, were less available as food for EP but a better food source for CP and EF. Authors suggest that differences may relate to food's physical availability in terms of its size and shape. Data relating zooplankton feeding at various phytoplanktonic concentrations could be described by following modification of relationship originally proposed by Ivlev: r=R(1-(exp(-kp))(exp(-kp- sub-0))), where r=ration, p=food density, R=maximum ration, k=proportionality constant, and p-sub-0=log prey density at which feeding ceased. In experiments described, rations as carbon (percentage body weight) were: (mean food size, 32 microns) PM, 0.8; EP, 15.0; CP+EF, 2.0; (mean food size, 8 microns) CP+EF, 4.1. EP food above subsistence level apparently went into egg production, observable as a distinct size fraction of the particulate biomass during Chaetoceros bloom.

Citation 364

PARSONS, T. R. , W. H. THOMAS, D. SIEBERT, J. R. BEERS, P. GILLESPIE

California Univ. , San Diego, La Jolla, CA, Inst. of Marine Resources

The Effect of Nutrient Enrichment on the Plankton Community in Enclosed Water Columns

Int Rev Gesamten Hydrobiol

1977,62(5),565-572.

English

Low level nutrient enrichment of an enclosed water column caused increases in primary, secondary and tertiary production. In addition, increases in the amount of sediment material heterotrophic activity and accumulation of major nutrients, nitrate and phosphate, were noted. In contrast, no change was observed in species diversity that could be attributed to nutrient enrichment. The combination of these effects is suggested as a diagnostic approach to examining the early effects of marine eutrophication.

Citation 365

PATTEN, BERNARD

Department of Marine Science, College of William and Mary and
Virginia Fisheries Laboratory, Gloucester Pt. , VA 23062

Plankton Energetics of Raritan Bay

Limnol Oceanogr

1961(Oct),6(4),369-387.

English

Plankton production in Raritan Bay is described based on total chlorophyll data and two series of 24-hr dark and light bottle differential oxygen experiments. Maximum chlorophyll recorded was 663 ug L-1 in a bloom of Massartia rotundata. Utility of pigment data in estimating productivity or biomass is regarded as dubious: i)17.3x10exp6 chains of Skeletonema costatum once corresponded to only trace quantities of chlorophyll; ii) production occurred several times in absence of detectable chlorophyll. (abbrev)

Citation 366

PATTEN, BERNARD C.

Department of Marine Science, College of William and Mary and
Virginia Fisheries Laboratory, Gloucester Point, VA

Negentropy Flow in Communities of Plankton

Limnol Oceanogr

1961,6(1),26-30.

English

A model generalizing negentropy flux in plankton communities is presented. An expression is derived for the total community information in a homogeneous water column of depth z assuming a logistic relationship between photosynthesis and light intensity. Various transformations of the exponent of this equation were developed for gross production, respiration, and net production in the whole water column. The cost in community negentropy to procure a unit of biotope negentropy was formulated. Empirical data are provided for a station in Raritan Bay which indicate a net loss of planktonic negentropy during the summer of 1959 amounting to 5.46 x 10exp20 bits/cm2/day. A comparison of observed costs with expected values computed from the model indicated no significant difference between expectation and observation, demonstrating the efficacy of the model even under conditions where the assumption of perfect homogeneity throughout the water column was only partially realized. (abbrev.)

Citation 367

PATTEN, BERNARD C. , GEORGE M. VAN DYNE

Oak Ridge National Laboratory, Oak Ridge, TN 37830

Factorial Productivity Experiments in a Shallow Estuary: Energetics of Individual Plankton Species in Mixed Populations

Limnol Oceanogr

1968(Apr),13(2),309-314.

English

A nonlinear programming method is described for estimating productivity parameters of individual plankton populations from data on mixed species water samples. The method is flexible in yielding average values over a treatment set established by experimental design. Specimen data on in situ populations of Skeletonema costatum are examined for illustration. Changes in estimated energy-processing characteristics of this diatom during a summer succession in the York River, Virginia, indicated a wide range of physiological states available to the species. Computed values of its gross production and respiration were correlated positively, but estimates of its productive output per individual were related inversely to corresponding values for other species. Various usages of the technique are discussed.

Citation 368

PAYNE, J. F.

Environment Canada, Fisheries and Marine Service, Biological Station, Water Street East, St. John's, Newfoundland

Mixed Function Oxidases in Marine Organisms in Relation to Petroleum Hydrocarbon Metabolism and Detection

Mar Pollut Bull

1977,8(5),112-116.

English

Several phyla from the coastal Northwest Atlantic were investigated for mixed function oxidases. Enzyme activity was related to petroleum hydrocarbon metabolism and detection in the marine environment.

Citation 369

PEARSON, ERMAN A. , GEORGE A. HOLT

University of California, Berkeley, CA

Water Quality and Upwelling at Grays Harbor Entrance

Limnol Oceanogr

1960,5(1),48-56.

English

The incoming ocean water entering Grays Harbor, Washington on flood tide was observed periodically to contain abnormally low dissolved oxygen concentrations. Low dissolved oxygen concentrations (<5.0 mg/L or 3.5 ml/L) were associated generally with significantly lower than normal ocean water temperatures which presumably results from upwelling along the coast. On a given tidal cycle the oxygen deficiency from normally assumed saturation levels for ocean water is equivalent to the oxygen demand associated with the domestic sewage discharge of 20 million persons. It appears that upwelling phenomena may negate conclusions based on oxygen balances in pollutional analyses of estuaries unless the actual dissolved oxygen concentration at the ocean source is determined.

Citation 370

PEARSON, T. H.

Dunstaffnage Marine Research Laboratory, Oban, Argyll, Scotland

The Effect of Industrial Effluent from Pulp and Paper Mills on the Marine Benthic Environment

Proc R Soc Lond B Biol Sci

1972,180,469-485.

English

The types of effluent discharged by wood-processing industries and their effects on the benthic environment are described. A brief summary of the results of the Lochs Linnhe Eil survey 1964-70 is given. Populations of the molluscs Corbula, Thyasira and Myrtea have increased in most areas, and appear to be favoured by a moderate increase in the organic input to the system. Corbula dominates in the shallower polyhaline areas, and Myrtea in the deeper mixoeuhaline areas. On sediments with a high natural leaf litter content a low diversity fauna occurs, dominated by the annelids, Cirriformia, Peloscolex, Capitella and Staurocephalus, and the crustacean Idotea. The predominance of this kind of fauna has increased in its area of occurrence in recent years. Comparisons of these faunal distributions and changes with those found in surveys in other marine areas affected by wood-processing wastes and other types of organic effluents show considerable similarities in the faunal changes occurring under increased organic loading. The utility of 'indicator' species in the assessment of organic pollution is briefly discussed. The need for detailed information on the ecological and physiological reasons underlying the varied faunal successions which occur under conditions of pollutional stress is emphasized.

Citation 371

PEARSON, T. H. , R. ROSENBERG

Dunstaffnage Marine Research Laboratory, Oban, Argyll, Scotland

Macrobenthic Succession in Relation to Organic Enrichment and Pollution of the Marine Environment

Oceanogr Mar Biol Ann Rev

1978,16,229-311.

English

In this review we have tried to focus attention on changes in physical environmental and biological parameters brought about by increased organic enrichment and the consequent changes in sedimentary and biological structure. If organic enrichment is of a certain magnitude it will superimpose its own gradient on the environment and induce modifications of the distribution of organisms initially controlled by, for example, salinity and temperature. Faunal community structure along such gradients does not show distinct differences--rather the communities integrate continuously and the gradient of communities and environments may be defined as an ecocline (Whittaker, 1967) or coenocline (Lindroth, 1971). Literature reviewed suggests that benthic communities react similarly to organic pollution irrespective of geographical region. This assumption is based on data from coastal regions but there is no indication that ecological processes would differ in oceanic areas similarly affected. Between the two end points, the afaunal point and the 'normal' community, we have defined three successional stages: (1) the peak of opportunists, with few species in great numbers; (2) the ecotone point, where the abundance is low and evenness diversity high; and (3) the transition zone with initially great fluctuations of the populations progressing towards the more stable 'normal' community. These structural faunal changes are similar in both temporal and spatial gradients. It has been shown that the initial stages of recovery from enrichment and the last stages to survive following an excessive organic input are similar, with the same genera or even species occurring all over the world. The final stage of a recovery process,ie, the 'normal' community in that habitat, will naturally be habitat-dependent but is highly predictable for a given region.

Citation 372

PENUMALLI, B. R. , R. H. FLAKE, E. GUS FRUH

Biomedical Engineering Program, Department of Electrical Engineering, The University of Texas of Austin, Austin, TX

Large Scale Systems Approach to Estuarine Water Quality Modelling with Multiple Constituents

Ecol Model

1976,2,101-115.

English

A matrix model for simulating concentration distributions of water quality constituents with coupled reactions in an estuary is developed from a large scale systems approach. The model is an approximation to the set of coupled partial differential equations describing the process. This steady state approximation is formulated as a large algebraic system consisting of coupled subsystems. The large algebraic system is solved by an efficient iterative method. Results utilizing actual field data are presented for the nitrogen cycle with five constituent forms of nitrogen for Corpus Christi Bay, Texas. Simulated and observed concentrations are compared.

Citation 373

PER, P. A.

Goucher Coll. , Towson, MD

Evaluation & Predictions on Eutrophication of Bush Sub-Estuary

Soc. of Systematic Zoology, Meeting, Washington, DC, 29 (Dec) 1972

1972(Dec), A724330.

English

Citation 374

PERES, J. M. , J. PICARD

Centre d'Oceanographie, Marseille (France), Station Marine d'Endoume

Causes of Decrease and Disappearance of the Seagrass Posidonia oceanica on the French Mediterranean Coast

Aquatic Bot

1975(June),1(2),133-139.

English

Two causes which also represented two stages of the decrease of seagrass, Posidonia oceanica, were observed in the Gulf of Marseilles. The first cause was determined to be the increase in the level of global pollution, mostly sewage which increased the turbidity of seawater through eutrophication and induced the compensation depth to decrease by 5-8 meters, causing the deepest parts of the beds to disappear. The second cause was related to the increase of clay sedimentation which arose from harnessing the Rhine River. Ecological effects were discussed in relation to the disappearance of Posidonia beds and the existing ecosystems.

Citation 375

PERKINS, E. J. , O. J. ABBOTT

Univ. of Strachclyde, Marine Lab. , Garelochhead, Dunbartonshire, Scotland

Nutrient Enrichment and Sand Flat Fauna

Marine Pollut Bull

1972(May),3(5),70-72.

English

Nutrient enrichment from sewage discharges may be advantageous or damaging depending on the circumstances. Enrichment leading to a dense growth of Enteromorpha on a sandy beach is accompanied by anaerobic conditions in the substrata, leading indirectly to the loss of mollusc and worms, to the possible detriment of fisheries. Observations made in the Clyde estuary, Scotland, are discussed.

Citation 376

PETERS, J. J. , R. WOLLAST

Laboratoire de Recherches Hydrauliques, Antwerp (Belgium)

Role of the Sedimentation in the Self-Purification of the Scheldt Estuary

In: Proceedings of the Third Federal Inter-Agency Sedimentation Conference, Denver, Colorado, 22-25(Mar)1976, Water Resources Council, Washington, DC, Sedimentation Committee

1976,3-77 - 3-86.

English

The hydrographic basin of the Scheldt River covers a heavily populated and industrialized region and drains waters extremely polluted due to uncontrolled discharges. In this partially stratified estuary, the mixing process of fresh and salt water is responsible for an important deposition of the suspended load of the river in a restricted area corresponding to the harbor of Antwerp. This important shoaling is explained by the physico-chemical properties of the suspended matter and the hydrodynamical characteristics of the estuarine region. Taking into account the physical characteristics of the Scheldt, the estuary was divided into two zones: an upper one from km 100 to km 55 and a lower one from km 55 to the mouth. Four times a year fixed stations situated at the boundaries of these regions were managed during 5 days; hourly samples were taken at three depths and continuous measurements of the profile of the currents along a vertical were performed. The mechanisms and characteristics of the mud deposition and their influence on the mass-transport, the accumulation, and the transformation of some typical elements in the estuarine zone of the Scheldt were presented. Observations over three years enabled the annual mass balances of input, transport, and accumulation by sedimentation of various pollutants in the two estuarine regions to be estimated. The role of the sediments on the oxygen budget was deduced from the previous mass-balances. Large concentrations of nutrients persisted in the brackish water zone where oxygen was available and turbidity was low. As a consequence, this zone was eutrophied and diatom blooms were frequent.

Citation 377

PETERSON, D. H.

US Geological Survey, 345 Middlefield Road, Menlo Park, CA94025

Oxygen, Carbon & Nitrogen (OCN) Distributions in Eutrophic Potomac River-Estuary

American Geophysical Union, Spring Meeting, Miami Beach FL 17-21 (Apr) 1978

1978,782 2126.

English

Citation 378

PETERSON, DAVID H. , JOHN F. FESTA, T. JOHN CONOMOS

US Geological Survey, 345 Middlefield Road, Menlo Park, CA 94025

Numerical Simulation of Dissolved Silica in the San Francisco Bay

Estuarine Coastal Mar Sci

1978,7,99-116.

English

A two-dimensional (vertical) steady-state numerical model that simulates water circulation and dissolved-silica distributions is applied to northern San Francisco Bay. The model (1) describes the strong influence of river inflow on estuarine circulation and, in turn, on the biologically modulated silica concentration, and (2) shows how rates of silica uptake relate to silica supply and mixing rates in modifying a conservative behavior. Longitudinal silica distributions influenced by biological uptake (assuming both vertically unifrom and vertically decreasing uptake situations) show that uptake rates of 1 to 10 ug-at l-1 day-1 are sufficient to depress silica concentrations at river inflows of 100-400 m3s-1, respectively, and that the higher rates appear ineffective at inflows above 400 m3s-1. The simulations further indicate that higher silica utilization in the null zone is not essential to depress silica concentrations strongly there. Advective water- replacement times at river inflows of 400,200 and 100 m3s-1 are computed to be less than 25,45 and 75 days, respectively, for a 120-km estuary-river system.

Citation 379

PETTI, M. J.

Rhode Island Univ. , Kingston, RI, Dept. of Civil and Environmental Engineering

Phosphorus Exchange at the Sediment-Water Interface of Selected Narragansett Bay Sediments

Rhode Island Univ.

1975, MS Dissertation, 89p.

English

In developing an understanding of water quality and its management, it is necessary to understand the materials balance or materials flux within a given water system. Among these materials are various pollutants, chemicals, gases, nutrients, biological communities, etc. The interaction of these materials (best described by the rate and extent of reaction) governs the overall aging process of a water system. Such an aging process and the parallel process of eutrophication can proceed naturally or be accelerated artifically. The objective of this study is to investigate an aspect of the materials balance in Narragansett Bay, Rhode Island. The material of primary concern is phosphorus, and the process under consideration is nutrient flux. Nutrient flux or exchange of phosphorous at the sediment-water interface with the water column above, as determined in the laboratory, of selected bay sediments is described. Two series of experiments were conducted. Each experimental series is composed of microcosm studies performed in the laboratory. The first series studies the release and uptake of phosphorus, to and from the water column, by the sediments in aerobic and anaerobic environments and a constant flushing rate.

Citation 380

PHEIFFER, T. H. , D. K. DONNELLY , D. A. POSSEHL

US Environmental Protection Agency, Annapolis Field Office, Annapolis, MD

Water Quality Conditions in the Chesapeake Bay System

US EPA

1972(Aug), Technical Rep. No. 55,48p.

English

Existing water quality conditions in the Chesapeake Bay and its tidal tributaries are delineated and water quality data and monitoring programs are evaluated in the context of a Bay management program. The study areas are the lower Susquehanna River, upper Bay and upper Eastern Shore, upper Western Shore, Baltimore Harbor, middle Western Shore, middle Chesapeake Bay, middle Eastern Shore, lower Eastern Shore, Patuxent River, Potomac River, Rappahannock River, York River, James River, and lower Chesapeake Bay waters. The available water quality information is assessed for each study area with specific reference to the following parameters: bacterial densities, DO, nutrients, heavy metals, and pesticides. Where sufficient data exist, as in the case of the Potomac Estuary, water quality trends are identified and their significance discussed. Inventories of industrial and municipal waste-water discharges are discussed. Based on nutrient input studies of the major tributary watersheds of the Chesapeake Bay, the Susquehanna River is the largest contributor of nutrients to the Bay. (Woodard-USGS)

Citation 381

PLATT, TREVOR, CHRISTIANE FILION

Fisheries Research Board of Canada, Marine Ecology Laboratory, Bedford Institute of Oceanography, Dartmouth, Nova Scotia

Spatial Variability of the Productivity: Biomass Ratio for Phytoplankton in a Small Marine Basin

Limnol Oceanogr

1973(Sept),18(5),743-749.

English

The productivity: biomass (P: B) ratio for phytoplankton was studied using a replicated sampling design at six stations in a small marine basin. On six out of ten sampling days, statistically significant differences were revealed in the P: B ratios between stations. This result is consistent with the concept of contemporaneous disequilibrium which emphasizes the spatial component of the heterogeneity of the phytoplankton habitat.

Citation 382

PLATT, TREVOR, D. V. SUBBA RAO

Bedford Inst. , Dartmouth (Nova Scotia), Marine Ecology Lab

Primary Production Measurements on a Natural Plankton Bloom

J Fish Res Board Can

1970,27(5),887-899.

English

The samplings were made one mile from the shore of Nova Scotia at six depths from 1 to 40 meters. Analyses included determinations of primary production by the in situ C-14 method, photosynthesis; respiration and chlorophyll c; chlorophyll a ratios, particulate carbon, ash content, phosphorus, silica, nitrates, incident radiation, and transparency. The observations suggested that culture trails provide satisfactory analogues of natural plankton systems under bloom conditions. As inferred from calorific values, phytoplankton in senescent stages of the bloom has no tendency to store fat. No single quantity served as an indicator of the physiological vigor of the plant community.

Citation 383

POIRRIER, MICHAEL A. , JAMES S. ROGERS, MAUREEN A. MULINO, ELLIOT ST. EISENBERG

New Orleans Univ. , LA Dept. of Biological Sciences

Epifaunal Invertebrates as Indicators of Water Quality in

Southern Lake Pontchartrain

WRRI Louisiana

1975(May), Rep. No. TR-5,52p.

English

The distribution and relative abundance of estuarine epifaunal invertebrates can be used to detect water quality differences. Epifaunal invertebrates associations were affected by salinity and storm-water discharge. Differences among both biological and physico -chemical stations were related to discharge of more saline water by the Industrial Canal and quality differences of outfall discharge. In 1973 the opening of the Bonnet Carre Spillway added alkaline nutrient-rich, freshwater from the Mississippi River and affected all water quality parameters. Gradual changes occurred as the river water was flushed from the lake. Increased phytoplankton growth resulted from the addition of nutrients. Epifaunal invertebrates were not greatly affected because 26 predominantly estuarine taxa were present 6 weeks after the spillway was closed. Storm-water discharge by outfall canals adds plant nutrients, coliform bacteria and other undesirable substances to the lake. Salinity was lower, but alkalinity, pH and nutrient values were higher due to the spillway opening and heavy rainfall. There was a west-to-east gradient of changing water quality in near-shore stations.

Citation 384

POLISHCHUK, L. N.

Zooplankton of the Dniester Estuary and Adjacent Seaside under Anthropogenic Influences

Gidrobiol Zh

1976,12 (6),37-45.

English

Reduction in the Dniester river runoff and the construction of a canal resulted in significant changes in the biological state of the estuary. On the one hand, intrusion of marine fauna increased, on the other hand, the number of freshwater fauna representatives decreased. The number of marine immigrants is especially high in periods of low percipitation. Quantitative changes also took place: the amount of zooplankton in summer is six times as low as in the 50's. In the marine areas adjacent to the estuary there occur both quantitative and qualitative changes in zooplankton. They are mostly due to an increased eutrophication of the Black Sea north-western shelf by river waters oversaturated with organic substances from industrial, agricultural and domestic waste.

Citation 385

POMEROY, L. R. , E. E. SMITH , CAROL M. GRANT

Dept. of Zoology and Marine Institute, University of Georgia, Athens, GA

The Exchange of Phosphate between Estuarine Water and Sediments

Limnol Oceanogr

1965,10(2),162-167.

English

The exchange of phosphate between water and sediments of Doboy Sound, Georgia, was studied experimentally with freshly collected core samples and suspensions of surface sediment, using 32P as a tracer. The exchange consists of a two-step ion exchange between clay minerals and water, plus an exchange between interstitial microorganisms and water. The exchange tends to maintain a concentration of phosphate in the water of one umole of phosphate liter. In undisturbed sediments the biological exchange is trivial, but in suspended sediments the biological exchange moves nearly as much phosphate as does the exchange with clay minerals. The rates of exchange and exchange capacity of the sediments are large enough to be significant ecologically, maintaining phosphate at a level favorable for continued production of plant populations.

Citation 386

POMEROY, LAWRENCE R. , L. R. SHENTON, R. D. JONES, ROBERT J. REIMOLD

Department of Zoology, Computer Center, Department of Statistics, and Marine Institute, University of Georgia, Athens and Sapelo Island, GA

Nutrient Flux in Estuaries

In: Nutrients and Eutrophication: the Limiting-Nutrient Controversy, Amer. Soc. of Limnology & Oceanography, Inc.

1972, Spec. Symp. Vol. 1,274-293.

English

The flux of phosphorus in several turbid, shallow estuaries on the Georgia coast is examined as an index of the function and stability of the system rather than as a limiting factor. The seasonal cycle of phosphorus concentration in estuarine water is described, and evidence is presented that this cycle is controlled primarily by shifting rates of metabolic processes that move phosphorus from sediments to water. Direct equilibria between sediments and water are of secondary importance. Streamflow has a negative effect on the concentration of phosphorus. Those estuaries with the lowest streamflow have the most phosphorus in their water. Mathematical models of the flux of phosphorus in the estuarine system are described. Simulated perturbations of the system verify the importance of nutrient reserves in the sediments but suggest that estuaries with much smaller reserves than those in Georgia will be equally stable and productive. The cycles of phosphorus and productivity of other estuaries, polluted and unpolluted, are discussed in relation to these findings.

Citation 387

POON, C. P. C.

Rhode Island Univ. , Kingston Dept. of Civil and Environmental Engineering

Nutrient Exchange in Water-Sediment Interface and its Effects on Water Quality

Rhode Island Univ.

1975, Completion Rep. OWRT B-052-RI(I),13p.

English

Profiles of carbon, nitrogen, phosphorus, iron and manganese of Narragansett Bay sediments were established after extensive physical and chemical analyses of samples taken at various locations in the Bay. These profiles reveal the history of pollution in the Bay. Relationships between metals and the nutrients were also established. Clear trends of increasing NH3-N and available-P concentrations in deeper layers of sediments with corresponding decrease of organic carbon were detected. Dredging of the sediment could expose these higher NH3-N and available-P concentrations to the overlying water. Microcosm study showed that the sediments could act as a source or sink of phosphorus under various conditions. The dissolved oxygen content, phosphorus concentration in water and available-P in sediment dictate the amount of P release or uptake by the sediment. In heavily polluted areas, the seawater flushing rate increases the phosphorus flux rate and vice versa. The steady state flux of P varies from 20 to 440 ug-P/m2/hr in Narragansett Bay depending on location and flushing rate. No NH3-N release from Narragansett Bay sediments occurs and consequently only phosphorus is considered a potential nutrient source in the sediment.

Citation 388

POORE, G. C. B. , J. D. KUDENOV

Victoria Ministry for Conservation, Melbourne(Australia), Marine Pollution Studies Group

Benthos around an Outfall of the Werribee Sewage Treatment Farm, Port Phillip Bay, Victoria

Aust J Mar Freshwater Res

1978,29,157-167.

English

A square km of area adjacent to the 145W outfall of the Werribee sewage-treatment farm was sampled for sediment, water chemistry and macrobenthos. Sediments nearshore were more sandy and more uniform than those offshore. Water salinity and nutrient concentrations (particularly ammonia) in overlying and interstitial water decreased rapidly with increasing distance from shore. The fauna was rich and contained several euryhaline and opportunistic species. Classification analysis revealed an offshore and a nearshore group of stations, and possibly a third group around the outfall. The distribution of common species was correlated with depth, sediment parameters or interstitial phosphate concentrations. The benthos of the 145W drain was distributed patchily but the station closest to the outfall (within 300 m) had high densities, high proportions of scavengers and deposit-feeders, high sediment organic fraction and high interstitial nutrient concentrations. The effect of the drain on the macrobenthos is exerted through particulate organic matter, dissolved nutrients and freshwater inputs.

Citation 389

POORE, GARY C. B. , JERRY D. KUDENOV

Marine Studies Group, Ministry for Conservation, 605 Flinders Street Extension, Melbourne, Vic. 3000

Benthos of the Port of Melbourne: The Yarra River and Hobsons Bay, Victoria

Aust J Mar Freshwater Res

1978,29,141-155.

English

The distribution of soft-bottom macrobenthos in the Yarra River and Hobsons Bay, Vic. , is examined in terms of temporal changes in abundance and diversity, and related to selected environmental variables. Hierarchical classification was used to divide the stations into three zones: upstream river stations; downstream river stations with muddy bay stations; and sandy bay stations. The faunas of the river and the central muddy basin of Port Phillip Bay are similar although several common Bay species were absent in the river, probably as a result of competition and lowered salinity and dissolved oxygen. Faunal diversity of the Yarra River was lower than that of Hobsons Bay and is lower than that of equivalent areas in the northern hemisphere. Seasonality in species composition or diversity was not observed. The dominant river species, Theora fragilis (Bivalvia), was more abundant in the lower river than anywhere in Port Phillip Bay. Its life expectancy and density were lowest at stations further up the river. Species diversity seems more predictable in highly diverse communities lacking dominant species than in communities of low diversity dominated at all times by one or two species.

Citation 390

POTERA, G. T. , E. E. MACNAMARA

Lehigh Univ. , Bethlehem, PA , Dept. of Biology

Spartina alterniflora (Tall) Productivity in a Polluted New Jersey Estuary

Bull N J Acad Sci

1972,17(1),13-14.

English

Net primary productivity for cord grass, S. alterniflora (tall), based on several 1 m2 harvest sites from a polluted northern New Jersey estuary is presented. Average productivity for the New Jersey site was more than 40% greater than reported cord grass productivity at Hempstead, Long Island. The significant increase in productivity was attributed to a slightly longer growing season.

Citation 391

QASIM, S. Z. , S. WELLERSHAUS, P. M. A. BHATTATHIRI, S. A. H. ABIDI

National Inst. of Oceanography, Cochin (India), Biological Oceanographic Div.

Organic Production in a Tropical Estuary

Proc Indian Acad Sci

1969(Feb),69(2)B, 51-94.

English

Daily and seasonal rates of primary production in tropical estuaries and their critical appraisal were investigated on the basis of observations recorded at four stations located in the upper reaches of the Cochin Backwater estuary, and several earlier publications. The article contains the following sections: (1) introduction, (2) procedure and methods; (3) the environment; (4) rate of photosynthesis; (5) incubation time and diurnal rhythm; (6) photosynthesis as a function of illumination; (7) gross and net production; (8) seasonal changes in production rates; (9) factors influencing organic production; (10) estimation of production from radiation and chlorophyll; (11) productivity in relation to particular matter; (12) annual production; (13) efficiency; and (14) productivity in relation to zooplankton. the study shows that in a highly turbid and polluted estuary the C-14 assimilation is nearer to net production and the diurnal rhythm in photosynthesis is associated with the increase and decrease in daily illumination. Seasonal changes in the production rates ae not well marked and show only 3- to 4-fold increase in certain months. The study also shows that for most of the year, primary production seemed nonexistent at depths greater than about 4 m and temperature and nutrients are not limiting factors in the estuary.

Citation 392

RALSTON, STEPHEN

University of Hawaii, Department of Zoology, Honolulu, HA

96822

Anomalous Growth and Reproductive Patterns in Populations of Chaetodon miliaris (Pisces, Chaetodontidae) from Kaneohe Bay, Oahu, Hawaiian Islands

Pac Sci

1976,30(4),395-403.

English

Specimens of Chaetodon miliaris collected in Kaneohe Bay, Oahu, during a 15-month study appeared to be reproductively inactive and were smaller than were those from other Hawaiian study areas. Additionally, they lacked calanoid copepods in their diet, the main food consumed elsewhere. It is suggested that the absence of this food in their diet resulted in a dietary deficiency leading to poor growth and reproductive inactivity.

Citation 393

RAYMONT, J. E. G.

University College, Southampton

Further Observations on Changes in the Bottom Fauna of a Fertilized Sea Loch

J Mar Biol Assoc UK

1949,28,9-19.

English

An account is given of the further changes in the bottom fauna of a fertilized sea loch (Loch Craiglin) from 1944 to 1947, and the results are compared with those obtained from 1942 to 1944. The bottom fauna density fell markedly during 1944, despite the addition of very large quantities of fertilizers. Unfavourable hydrographic conditions, especially low oxygen tensions, are considered to be responsible for the decrease. Densities higher than ever obtained before in Loch Craiglin were found in the summer of 1945 (average of 23,000 animals/m2), when favourable hydrographic conditions once more existed. The little evidence available suggests that the high productivity was maintained during 1946, although only a very little fertilizer was added during that year. By 1947 the average density of bottom fauna had fallen to only 7500 animals/m2 and it is suggested that this drop was correlated with less nutrients being available, since no fertilizers were added after January 1946. Hydrobia ulvae became progressively more important from 1944 onwards, and was the dominant member of the bottom fauna from 1945. Reasons are advanced for the progressive rise in numbers of this species. The average dry weight of flesh of the bottom fauna rose from 3 g/m2 in 1942 to 9 g/m2 in the summer of 1943. It fell to 3.5 g in 1944, rose to 19.5 g in 1945 but declined again to 7.5 g in the summer of 1947. The results suggest that with constant application of fertilizers at least two to three years are necessary to achieve maximum production from the bottom fauna. Further, even after two and a half years had elapsed since regular fertilization was practised, the bottom fauna production was still more than twice as great as under 'natural' conditions.

Citation 394

RAYMONT, J. E. G.

Department of Oceanography, The University Southampton, Great Britain

Some Aspects of Pollution in Southampton Water

Proc R Soc Lond B Biol Sci

1972,180,451-468.

English

The levels of some trace metals have been studied in Southampton Water. Particulate iron, though variable, is generally high and the concentration appears to be correlated with the amount of particulate matter. Zinc is approximately doubled in concentration inside Southampton Water, but much higher levels are occasionally encountered. Copper and nickel are only somewhat higher and total mercury is lower inside Southampton Water than in Solent waters. Zinc and copper are concentrated approximately 30000 times on a dry mass basis by Mercenaria mercenaria. Mercury is concentrated by Mercenaria and other bivalves; the mud which is especially rich in total mercury may represent an important source of mercury for those animals. Primary nutrients, phosphate, nitrate and ammonium, increase in concentration from seaward on proceeding up the estuary. Surface waters appear to be especially rich in nitrate and ammonium. Gross pollution seems unlikely in view of low nitrite concentration and high oxygen values virtually throughout the estuary. The high rate of turnover of organic substrates by heterotrophic organisms may be associated with relatively large amounts of organic matter in Southampton Water. This has to some extent been confirmed by direct surveys of particulate and dissolved organic carbon which also suggest that regional differences exist. Higher levels of organic matter occur near the head of the estuary, near Marchwood, the Docks, and the mouth of the River Itchen. Although thermal changes in Southampton Water appear to have been slight, some increase in winter minimal temperatures and in summer maxima have occurred, especially in the Machwood area. A marked increase in Mercenaria mercenaria population may be associated with the small thermal rise and remarkably high population densities are encountered. Spawning appears to be correlated with summer temperatures exceeding 18 to 19 C. (abbrev.)

Citation 395

READ, P. A. , T. RENSHAW, K. J. ANDERSON

Napier College of Commerce and Technology, Colinton Road,
Edinburgh EH105DT

Pollution Effects on Intertidal Macrobenthic Communities

J Appl Ecol

1978,15,15-31.

English

(1) Changes in macrobenthic community structure along a pollution gradient in the Firth of Forth, were observed and quantified using four different measures of 'diversity': the Shannon- Weaver index H"; Evenness index E; Fisher index alpha and the Probability of Interspecific Encounter PIE. (2) The significance of differences between beaches, between sampling stations and between seasons were assessed by analysis of variance. (3) The four diversity indices were found to be closely correlated one with another; PIE being the one nearest to the centroid of the four. (4) Similar changes were observed along the pollution gradient for each of H", alpha and PIE but the Eveness index E reflected a somewhat different tendency. (5) Results show that gross pollution diminishes both 'dominance diversity' and 'species diversity' whereas more moderate pollution reduces 'species diversity' but is less effective in regulating 'dominance diversity'. (6) Differences in diversity and abundance between traverses and between levels at any one site can be explained by reference to various environmental factors. (7) Temporal changes in species numbers and individuals are apparent at all sites and these are reflected in the PIE values. The smallest temporal changes in PIE are associated with a grossly polluted beach (a stressed community)

whereas the largest relate to a relatively unpolluted beach (an unstressed community). This conflicts with the view that temporal change is large under physiological stress conditions in unstable environments and small under minimal stress conditions in physically stable environments.

Citation 396

REEBURGH, W. S.

Alaska Univ. , College, Inst. of Marine Science

Processes Affecting Gas Distributions in Estuarine Sediments

In: Environmental Framework of Coastal Plain Estuaries; 18th Annual Meeting of Southeastern Section of the Geological Society of America, 10-11(Apr)1969, Columbia, SC

1972, Memoir 133,383-389.

English

Summer and winter depth distributions of Ar, N2, CH4, total CO2, and total H2S were obtained at two stations in Chesapeake Bay. The data indicate that CH4 escapes the sediments as bubbles, stripping Ar and N2 from the sediments. Total CO2 increases to concentrations greater than 1,000 milliliters per liter with depth, and pH remains constant at about 7. Low and uniform total H2S concentrations indicate removal of sulfur as iron sulfides. The absence of CH4 in the upper 25 centimeters of these sediments and the presence of Ar and N2 in concentrations similar to the overlying water indicate mixing to at least this depth.

Citation 397

REEBURGH, WILLIAM S.

Johns Hopkins Univ. , Baltimore, MD, Chesapeake Bay Inst.

Observations of Gases in Chesapeake Bay Sediments

Limnol Oceanogr

1969(May),14(3),368-375.

English

Seasonal distribution of Ar, nitrogen, methane, and total carbon dioxide in Chesapeake Bay sediments was investigated on the basis of chemical analysis and bore drilling data. The methane contents increase with depth in the sediment from undetected quantities at the surface to concentrations of 150 and 85 ml/liter in water depths of 30.4 and 15.2 m, respectively. Ar and nitrogen are present in the surface sediments in concentrations near that of the overlying water and decrease with depth to values of 0.1 to 2 ml/liter. Stripping by bubbling of methane accounts for the selective removal of nitrogen and the decrease with depth of both Ar and nitrogen contents. Total carbon dioxide increases with depth up to 1,500 ml/liter concentrations. Low values of total hydrogen sulfide and an abundance of acid-labile sulfides in the sediments indicate the removal of sulfides species by mineral forming processes.

Citation 398

REGIER, HENRY A.

College of Fisheries, Univ. of Washington

A Balanced Science of Renewable Resources with Particular Reference to Fisheries

Univ. of Washington Press, Seattle, WA 98195

0-295-95602-X, 108p.

English

This book is a collection of ten lectures presented by Henry A. Regier at the College of Fisheries, University of Washington in April 1976. In these lectures, Dr. Regier analyzes the range of scientific approaches that can be and are brought to bear on environmental problems. He points out how the differing approaches fall into philosophical frameworks and thus are condemned to have specific strengths and weaknesses when applied to environmental analyses and management. Although the environmental and management aspects of fisheries are stressed, the discussions are pertinent to a broad range of environmental questions. It is significant that a scientist rather than a philosopher has made the effort to categorize the methodologies presently employed in environmental science and the techniques of applying these to resource management and relating them to philosophical doctrines. This approach allows the scientist reader to understand and accept more easily the reasons why scientific investigations progress along certain pathways and why some efforts succeed while others fail when the results of the investigations interface with social policies. Dr. Regier's effort may provide help in seeking the most effective route of applying knowledge to the management of natural systems.

Citation 399

REISH, DONALD J.

California State College, Long Beach, CA

Marine and Estuarine Pollution

Water Pollut Control Fed

1972(June),44(6),1218-1226.

English

The 1971 literature on marine and estuarine pollution is reviewed. Monitoring and surveys of physical and biological characteristics of polluted areas, oil pollution, indicator organisms, bioassays, malformations, microorganisms, and water movements are discussed. The effects on organisms of wastewater effluents and the concentrations and metabolism of pollutants by various animals and algae were also studied.

Citation 400

REISH, DONALD J.

Department of Biology, California State College, Long Beach, CA

Biological Changes in Los Angeles Harbor following Pollution Abatement

Calif Mar Res Comm

1972, CalCOFI Rep. 16,118-121.

English

Citation 401

RENFRO, W. C.

Bureau of Commercial Fisheries, Galveston, TX, Biological Lab.

Gas-Bubble Mortality of Fishes in Galveston Bay, Texas

Trans Am Fish Soc

1963,92,320-322.

English

A kill of mostly spotted sea trout was observed in upper Galveston Bay. Other dead fish observed were largescale menhaden, bay anchovies, Atlantic croakers, small eels and long nose gar. Unusual features of the dead sea trout were excessive mucus in the body, bright red gills, distended swim bladders and blisters containing gas in various parts of the body. Dissolved oxygen saturation in the water reached near 250 percent saturation throughout the day. It was believed that surplus gas came out of solution in the body of the fish and obstructed circulation.

Citation 402

RESOURCE PLANNING SECTION, OFFICE OF PLANNING AND RESEARCH, GEORGIA DEPARTMENT OF NATURAL RESOURCES

Atlanta, GA

The Environmental Impact of Freshwater Wetland Alterations on Coastal Estuaries

GA Dept Nat Resour

1976(June), Technical Planning Seminar, 85p.

English

Freshwater wetlands serve many functions, some are values of their own unique systems, others help sustain the life and form of their seaward estuary. Section I of this conference report summarizes basic knowledge about the natural interactions of freshwater wetlands and estuaries. In Section II are papers providing supporting data and case studies.

Citation 403

REVELANTE, NOELIA, MALVERN GILMARTIN

Center for Marine Research, 'Institute Rudjer Boskovic', 52210 Rovinj, Yugoslavia

Characteristics of the Microplankton and Nanoplankton Communities of an Australian Coastal Plain Estuary

Aust J.Mar Freshwater Res

1978,29,9-18.

English

The relative importance of micro- and nanoplankton was evaluated in the Parramatta Estuary and Sydney Harbour, a culturally eutrophicated southern hemisphere estuarial complex, during a non-upwelling period following an extended drought. Nanoplankton: microplankton production ratios increased to 4.2 in the inner estuary, where the nanoplankton were dominant under conditions of increased nutrient supply. Primary production rates and chorolphyll a standing crops increased about 40-fold into the estuary, reaching 175 mg C m-3 h-1 and 19 mg chl a m-3 respectively. Outer, middle, and inner estuarial regions were distinct, and clearly defined by phytoplankton community characteristics and species distribution. All dominants and co-dominants were neritic temperate species ubiquitous in the estuary, but less abundant microplankton species of tropical origin were the most useful as indicator species of the extent of oceanic influence.

Citation 404

RILEY, GORDON A.

Bingham Oceanographic Laboratory, Yale University

Organic Aggregates in Seawater and the Dynamics of Their Formation and Utilization

Limnol Oceanogr

1963,8(4),372-381.

English

Much of the nonliving particulate organic matter in seawater consists of delicate, plate-like aggregates ranging in size from about 5 u to several mm in diameter. The aggregates are amorphous matrices containing both organic and inorganic materials, with inclusions of bacteria and phytoplankton. Descriptive information herein deals primarily with a two-year series of observations in Long Island Sound. A consistent biomodal seasonal cycle has been found, with peaks in winter and early summer. These aggregates appear to be formed mainly by adsorption of dissolved organic matter on bubbles and other naturally occurring surfaces in the sea, a process readily duplicated under experimental conditions. Naturally occurring aggregates provide a substrate for bacterial growth and probably food for animals. They are present during certain seasons when phytoplankton is scarce and probably serve an important function as supplementary food for zooplankton under such circumstances. The presence of aggregates is an oceanic as well as a coastal phenomenon and is believed to have general ecological significance. A concept is developed that the reversible reaction between dissolved and particulate matter tends to stabilize the marine association, and there are suggestions of community adaptation in the development of this system.

Citation 405

ROHATGI, NARESH, KENNETH Y. CHEN

Environmental Engineering Prog. , Univ. of Southern California, Los Angeles, CA

Transport of Trace Metals by Suspended Particulates on Mixing with Seawater

J Water Pollut Control Fed

1975(Sept),47(9),2298-2316.

English

Under aerobic conditions with seawater salinity, trace metals were observed to be released from suspended particulates, especially in the cases of Cd, Cu, Ni, Pb, and Zn. The release of trace metals was observed to occur in two stages; an initial rapid release, followed by a slower, long-term release. Release of trace metals may be attributed to (a) the oxidation of organic matter or metal sulfides; (b) desorption forms, which depend mostly on the dilution ratio and pH of seawater; and (c) the formation of metal chloride as well as organo-metallic complexes.

Citation 406

ROMAN, M. R.

New Hampshire Univ. , Durham, NH, Dept. of Zoology

Tidal Resuspension in Buzzards Bay, Massachusetts. II. Seasonal Changes in the Size Distribution of Chlorophyll, Particle Concentration, Carbon and Nitrogen in Resuspended Particle Matter

Estuarine Coast Mar Sci

1978(Jan),6(1),47-53.

English

Seasonal changes in the particle size spectrum of suspended matter in near bottom water of Buzzards Bay was studied by fractional filtration. The greatest fraction of the total particulate organic carbon and particulate organic nitrogen throughout the year was less than 20 micrometers. The relative independence of the seasonal size distribution of particulate carbon to changes in the chlorophyll, as well as high carbon/nitrogen ratios during winter, suggest that large amounts of detritus are present in Buzzards Bay. Chlorophyll distribution was dominated by nanoplankton grazers abundant. The winter and fall phytoplankton blooms were dominated by individual and chain-forming diatoms greater than 53 micrometers. The dominance of a nanoplankton and nanodetritus (less than 20 micrometers) in the suspended matter of Buzzards Bay suggests that the major source of nutrition for filter feeding zooplankton are small particles.

Citation 407

ROSENBAUM, ARLENE, A. Y. KUO, BRUCE J. NEILSON

Virginia Institute of Marine Science, Gloucester Point, VA 23062

A Water Quality Model of the Pagan River

Appl Mar Sci Ocean Eng

1977(Oct), Special Rep. 148,102p.

English

The purpose of this report is to describe the model which was applied to the Pagan River and to document its calibration and verification. A detailed description of the model, its many components, internal interactions and the various assumptions employed is given in Chapter 2. This discussion is of a rather technical nature, since it is intended to provide a definitive presentation of the model and its inner workings. A more general presentation of the model and how it works will be given in future reports on the results of the modelling studies. In Chapter 3, the various data sets required for the model are presented, and the calibration and verification results are included in Chapter 4. The final chapter is a discussion of several aspects of water quality which were observed during the model studies. The model used in this study is a one-

dimensional, intra-tidal ecosystem model which simulates the longitudinal distribution of cross-sectional average concentrations of water quality parameters, including the temporal variation of these concentration fields in response to tidal oscillation. The model includes the following water quality variables: dissolved oxygen, carbonaceous oxygen demand, organic nitrogen, ammonia nitrogen, nitrite-nitrate nitrogen, organic phosphorus, inorganic phosphorus, phytoplankton represented by chlorophyll "a", coliform bacteria and salinity. Temperature, turbidity, and light intensity are important parameters for the biochemical interactions taking place, but they are not modeled directly. Rather they are assumed constant during model simulations and, therefore, are included in the input data set.

Citation 408

ROSENBAUM, ARLENE, BRUCE NEILSON

Virginia Institute of Marine Science, Gloucester Point, VA 23062

Water Quality in the Pagan River

Appl Mar Sci Ocean Eng

1977(Oct), Special Rep. 132,62p.

English

The Pagan River is a small coastal plains estuary located on the south side of the James River Estuary in Isle of Wight County. The Pagan is tributary to the James, entering it some 25 kilometers (15 miles) upriver of Old Point Comfort (see Figure 1). The drainage basin contains only about 185 square kilometers (71 square miles) and most of the land uses are rural in nature. More than half the watershed is forested and slightly more than a third of the land is used for agriculture, mostly cropland with only a small portion used as pastures. There are more than 1000 hectares (2600 acres) of marsh within the basin and most of this is tidal. Residential, commercial and industrial land uses account for less than 5% of the total area. The purpose of this report is to present and summarize water quality data collected during the summer of 1976 as part of the Hampton Roads 208 Study. These data also have been used to calibrate and verify a mathematical model of water quality in the Pagan River. A description of the model and the calibration procedures are given in a separate report. A third report will present the findings of the model studies.

Citation 409

ROSENBERG, R.

Sweden Water and Air Pollution Research Lab. , Goteborg

Benthic Faunal Dynamics During Succession Following Pollution Abatement in a Swedish Estuary

Oikos

1976,27(3),414-427.

English

Following the closure of a sulphite pulp mill the recovery and succession of the macrobenthic communities was monitored. Community composition similar to that recorded forty years before was achieved within eight years. The sequential changes of some numerically dominant populations showed a bell-shaped curve pattern. During the first years after pollution abatement, when polychaetes dominated, population changes were drastic but evened out in later seral stages. The role of larval recruitment in succession is discussed. Three diversity indices were used to assess the community structure: Shannon's formula, its measurement of evenness, and Sanders' rarefaction technique. As tools for assessing pollution or recovery, the two former had to be used with care, as the highest values were recorded at the beginning of the recovery process when the individuals found were few but evenly distributed among the few species present. The rarefaction technique and the measure of species richness were more satisfactory for this kind of assessment.

Citation 410

ROWE, G. T. , C. H. CLIFFORD, K. L. SMITH

Woods Hole Oceanographic Institution, MA

Benthic Nutrient Regeneration and its Coupling to Primary Productivity in Coastal Waters

Nature

1975(May),255,215-217.

English

The high primary productivity of coastal ocean waters is attributed to nitrogen regeneration from continental shelf sediments. In situ measurements in the New York Bight of the rate at which ammonia and nitrate diffuse into the water column from sediments were based on the assumption that the breakdown of organic matter in sediments is proportional to the amount of oxygen required. Thus for each milliter of oxygen consumed, 0.412 mg organic carbon is oxidized to carbon dioxide. Because the organic carbon-nitrogen ratio in sediments is about 10:1 or greater, it was construed that 0.041 mg organic nitrogen would be remineralized to ammonia for each milliter of oxygen consumed. Both the sediment oxygen demand and ammonia production were highly dependent on temperature. Most of the nitrogen at warmer temperatures was in ammonia form; at lower temperatures nitrogen may be lost by denitrification to elemental nitrogen. When the bottom respiration on the continental shelf is approximately 10-20 ml/sqm/hr 4.12 mg organic carbon and 0.412 mg organic nitrogen would be oxidized to carbon dioxide or deaminated to ammonia. If about 80% of the ammonia were released from the sediment the average feedback would be about 23.5 microgram atom nitrogen/sqm/hr. The high ammonia concentrations were not due to advection from offshore waters or from Hudson River effluent.

Citation 411

RUSSELL, CLIFFORD S.

Resources for the Future, Inc. , Washington, DC

Ecological Modeling in a Resource Management Framework

National Oceanographic and Atmospheric Administration, Marine Ecosystems Analysis Program, Proceedings of a Symposium

1975 (Jul), Library of Congress Catalog Card No. 75-15108,400p.

English

The report is a collection of papers concerning both physical and ecological modeling for a number of specific locations. Titles of the papers are: Ecological modeling in a resource management framework: An introduction; CLEANER: The Lake George model; A discussion of CLEAN, The aquatic model of the Eastern deciduous forest biome; The Delaware Estuary model; Application of mathematical models to the study, monitoring and management of the North Sea; Phytoplankton models and eutrophication problems; Fish population models; Potential and actual links to ecological models; Fisheries and ecological models in fisheries resource management; Management of large - scale environmental modeling projects; and Present problems and Future prospects of ecological modeling.

Citation 412

RYTHER, J. H. , W. M. DUNSTAN, K. R. TENOR, J. E. HUGUENIN

Woods Hole Oceanographic Institution, MA

Controlled Eutrophication-Increasing Food Production from the Sea by Recycling Human Wastes

BioScience

1972(Mar),22(3),144-152.

English

The essential feature of 'controlled eutrophication' is the physical separation and compartmentalization of the producer and consumer levels of a biological community. Following these guidelines, laboratory experiments were begun in the summer of 1970 on the growth kinetics of marine plankton algae grown in seawater enriched with effluent from a secondary sewage treatment plant. In general, diluted sewage was found to be an excellent culture medium for the marine phytoplankton. At concentrations of 10 percent sewage, the yield of algae increased with flow rate through the system up to a 'turnover rate' of 50 percent of the culture per day. These algae were subsequently fed to monitored oyster cultures, thus completing the producer-consumer food chain. In one such experiment, a natural population of diatoms grown on 10 percent sewage was passed through a 3m x 1.5m x 0.5 in. tank containing suspended strings of oyster spat attached to scallop shells. Over 30 days, at 7-10C, the oysters removed 77 percent of the algae and converted 22 percent of the cells into new oyster flesh. These and similar experiments have provided basic data on the kinetics and bioenergetics of a small scale 'controlled eutrophication program' and revealed the value for developing applications in advanced sewage treatment and commercial aquaculture.

Citation 413

RYTHER, JOHN H. , WILLIAM M. DUNSTAN

Woods Hole Oceanographic Institution, Woods Hole, MA 02543

Nitrogen, Phosphorus, and Eutrophication in the Coastal Marine Environment

Science

1971(Mar),171(3975),1008-1013.

English

The distribution of inorganic nitrogen and phosphorus and bioassay experiments both show that nitrogen is the critical limiting factor to algal growth and eutrophication in coastal marine waters. About twice the amount of phosphate as can be used by the algae is normally present. This surplus results from the low nitrogen to phosphorus ratio in terrigenous contributions, including human waste, and from the fact that phosphorus regenerates more quickly than ammonia from decomposing organic matter. Removal of phosphate from detergents is therefore not likely to slow the eutrophication of coastal marine waters, and its replacement with nitrogen-containing nitrilotriacetic acid may worsen the situation.

Citation 414

SAKSHAUG, E. , S. MYKLESTAD

Trondheim Univ. (Norway), Biological Station

Studies on the Phytoplankton Ecology of the Trondheimsfjord: III. Dynamics of Phytoplankton Blooms in Relation to Environmental Factors, Bioassay Experiments and Parameters for the Physiological State of the Populations

J exp mar Biol Ecol

1973,11(2),157-188.

English

Quantitative phytoplankton sampling was carried out at weekly intervals at 1 station in the central part of the Tronheimsfjord (Norway) and at irregular intervals at one station near Trondheim Harbor during March-Oct. , 1970 and 1971. Stages of diatom blooms were related to variations in freshwater discharge, hydrography, nutrients (nitrate, orthophosphate and reactive silicate in sea water and river water), light, the results of bioassay experiments, parameters for the physiological state of natural phytoplankton populations, and data on phytoplankton and hydrography collected during 1963-1969. Two spring blooms of diatoms are persistent in the area. The first one starts in March, triggered by an increase in the incident radiation and culminates in early April. It develops analogously to a batch culture and is nourished mainly by nutrients accumulated during the winter. The 2nd takes place in brackish waters during May-June concomitant with floods in rivers. The magnitude of its populations corresponds to discharge maxima unless disturbed by hydrographical irregularities and heavy grazing by Calanus finmarchicus (Gunnerus). In autumns of little discharge and with turbulence in the upper 5-10 m dinoflagellates predominate. In high salinity waters N seems generally more limiting than P for phytoplankton growth. The N/P atomic ratio of such waters with no phytoplankton growth was 10-12 in contrast to 13-18 in the phytoplankton. Due to the high N/P ratio of 40-50 in river water, P was more limiting than N in some brackish waters. On 2 occasions trace metals seemed to be the most limiting.

Citation 415

SALES, HENRY J. , R. V. THOMANN

Hydroscience, Westwood, NJ 65807

A Steady-State Phytoplankton Model of Chesapeake Bay

J Water Pollut Control Fed

1978,50,2752-2770.

English

A simplified quasi-linearized model, a set of 5 algebraic equations for each of 52 segments of the Bay used. Data base appears to be mid-Bay, deep water stations from Chesapeake Bay Institute and from the Environmental Protection Agency. Historic trends from about 1945-1975 are shown for Chlorophyll a, inorganic nitrogen and inorganic phosphorus; chlorophyll a increased from about 5 to a range of 20-40 ug/l. Data and model are for vertically averaged 'well mixed' samples, not appropriate for some kinds of reality evaluation but possibly ok for a bay budget. Michaelis Menton constants (0.005 mg P/l, 0.025 mg N/l, 2/day maximum uptake rate) used for nutrient uptake. Susquehanna River inflow accounts for 90% of Bay freshwater input, concentration of N and P vs Susquehanna flow are given. Data and model both indicate that P limits phytoplankton growth in MD portion of the Bay. Chlorophyll a projections are given for various P loadings. Either N or P may limit below the Potomac. Tropical Storm Agnes effects on historic data are discussed. Study was done as part of an investigation of waste load allocations. Eight citations. Abstr. by KLW.

Citation 416

SANDERS, JAMES G.

Marine Science Program, University of North Carolina, Chapel Hill, NC 27514

Enrichment of Estuarine Phytoplankton by the Addition of Dissolved Manganese

Mar Environ Res

1978,1,59-.

English

The response of natural phytoplankton to additions of excess Mn in an estuary receiving sewage effluent varied with tidal amplitude. During periods of low tidal amplitude, when DOC concentrations were high, carbon uptake by phytoplankton was stimulated. When tidal amplitudes were relatively high, carbon uptake was not affected by Mn addition. The link between high DOC concentrations and stimulation suggests that the Mn addition either relieves a deficiency in available Mn caused by organic complexation or complexes organics from the sewage effluent which are otherwise harmful to phytoplankton productivity. Sewage effluent entering estuaries can be both beneficial and detrimental to the phytoplankton population. Productivity is increased by the addition of inorganic nutrients but may be depressed by the organics contained in the effluent.

Citation 417

SAYLOR, G. S. , J. D. NELSON, JR. , A. JUSTICE, R. R. COLWELL

Maryland Univ. , College Park, Dept. of Microbiology

Distribution and Significance of Fecal Indicator Organisms in the Upper Chesapeake Bay

Appl Microbiol

1975(Oct),30(4),625-638.

English

The survey reported upon provides evidence of significant levels of pollution from human wastes in the water, sediment, and suspended sediment throughout the Upper Chesapeake Bay. Highest counts of pollution indicator organisms were found at the confluence of the Susquehanna River and the Chesapeake Bay. Organisms were found to be quantitatively distributed independently of temperature and salinity and were not correlated with concentration of suspended sediment. However, 53% of total viable bacteria and more than 80% of fecal indicator organisms were directly associated with suspended sediments. Correlation coefficients for the indicator organisms ranged from 0.80 for bottom water to 0.99 for suspended sediment. Prolonged survival for the fecal streptocci was seen in most of the sediment samples. Further deterioration in water quality would seriously affect shellfish harvesting and recreational uses of the Upper Chesapeake Bay.

Citation 418

SCHMOEGER, DONALD R. , NELSON L. NEMEROW, EMIL J. GENETELLI

Nestle Company, Marysville, OH 43040

A Batch Algal Bioassay Procedure for Assessing Potential Eutrophication

In: Proceedings of the 29th Industrial Waste Conference 7-9(May)1974. Purdue Univ.

1974, Eng. Extension Ser. No. 145,897-904.

English

Anabaena flos-aquae, a blue green alga endorsed by the US EPA was employed to determine: 1) optimum (maximum) growth conditions of light, temperature (as per EPA), and aeration in a defined nutrient medium; 2) sensitivity of assay to minute nutrient changes; and 3) the effects of various degrees and concentrations of treated domestic sewage on a given algal population were analyzed to demonstrate the applicability and sensitivity of the proposed bioassay. Maximum cellular yields remained unchanged when the light intensity was varied between 300 and 600 fc's. Under the experimental conditions described, light was not a limiting factor and 600 fc was chosen arbitrarily as the standard. Optimum (maximum) growth was attained in the shortest period of time at a shaking speed of 100 rpm's. Mechanical shaking appears to help in achieving a level of growth at a faster rate but is otherwise unnecessary as handswirling will ultimately result in nearly the same yield.

The level of sensitivity to nutrient changes was computed to be about +2.5% absorption of 0.07 log 10 cells/ml. Growth yields were linear for dilutions of AAP medium and AAP medium with dilutions of phosphorus. Luxury uptake of phosphorus was noted but not to such an extent that might place limits on the sensitivity of the bioassay and necessitate the introduction of phosphorus starved inoculum. Nitrogen fixing was demonstrated for Anabaena flos-aquae. The use of this organism provides an effective means for assaying phosphorus limiting environments. In accordance with other investigators, concentrations of raw, primary settled, and treated domestic sewage approaching 50% seem to have an inhibitory or toxic effect on algal growth. The spectrophotometric monitoring system evaluated in this study generated statistically significant and reliable data within a short period.

Citation 419

SCHOFIELD, W. R. , R. G. KRUTCHKOFF

Virginia Polytechnic Inst. and State Univ. , Blacksburg, VA 24061

Deterministic Model of Dynamic Eutrophic Estuary

J Environ Eng Div Am Soc Civ Eng

1974(Aug),100(EE4),979-996.

English

A stochastic model for a 1-dimensional estuary was formulated. With the addition of a single parameter, a stochastic model can be built from its deterministic counterpart. The derivation was of sufficient generality to permit any number of components and any reasonable system configuration can be handled. All systems parameters, conditions, and forcing functions could be continuous functions of time(not just tidal phase), position, and if necessary, other factors. The Potomac Estuary was modeled for Jan. -Oct. 1969. Measured and predicted concentrations were compared in their means and distributions with good agreement. Use of the model for other estuaries is reccomended.

Citation 420

SCHOFIELD, WILLIAM A. , RICHARD G. KRUTCHKOFF

Virginia Polytechnic Inst. and State Univ. , Blacksburg, VA

Stochastic Model for a Dynamic Ecosystem

WRRI Virginia(Blacksburg)

1973 , Bull. No. 60.

English

A study was conducted to develop and verify, with actual data, a stochastic model of a dynamic ecosystem in a one-dimensional, eutrophic estuary. A quantitative relationship was established between causes and effects. The cause-effect relationship includes a random component that accounts for the stochastic nature of the process. A one-dimensional model that is more general and realistic than any previous estuary model has been developed. Generalizations have been made in the differential equations that were solved and in the initial and boundary conditions used. Also included is the way the physical conditions of cross -sectional areas, light intensities, fresh water flow rate, land runoff, benthal demand, and water temperature, depth, and turbidity were handled. The number of components considered and the use of time- and position-variable parameters are discussed.

Citation 421

SCHUBEL, J. R.

Director of Marine Sciences Research Center, State University of New York, Stony Brook, NY 11794

Fine Particles and Water Quality in the Coastal Marine Environment

The Institute of Electrical and Electronics Engineers, Inc.

1976, Annals No. 75CH1004-I 34-2,9p.

English

This report briefly summarizes data on the quantity of suspended particles in coastal environments and the effect of such concentrations on species compositions, siltation rates and patterns, and particle agglomeration. Special reference is given to anthropogenic particulate matter, regarding poor soil conservation and nutrient-loading from sewage wastes. Reports on the Chesapeake Bay are sited throughout the paper, including a discussion of the effect of Hurricane Agnes on suspended matter in the Bay. The author concludes with a list of eight possible research priorities for coastal waters. 48 references. Abstr. by JMB.

Citation 422

SCHUBEL, J. R. , C. H. MORROW, W. B. CRONIN

Maryland Fish and Wildlife Administrations, Annapolis, MD

Suspended Sediment Data Summary March 1966-May 1967, Upper Chesapeake Bay (Tolchester to Havre de Grace)

John Hopkins Univ.

1968(Nov), Chesapeake Bay Inst. Spec. Rep. 14,60p.

English

Twenty-four surveys were carried out measuring suspended sediment in the upper Chesapeake Bay during the period March 1966 through May 1967. The data collected on these cruises are summarized. The tables of data for each sampling site include location, date, time, weather, wind direction, wind speed, depth of sampling, water temperature, salinity, suspended sediment, combustible organic matter, and light penetration.

Citation 423

SCHULTZ, D. M. , J. G. QUINN

USGS, National Center MS 973, Reston, VA 22092

Suspended Material in Narragansett Bay: Fatty Acid and Hydrocarbons Composition

Org Chem

1977,1,27-36.

English

Suspended materials were collected from the top 20 cm of the water surface at 10 stations in Narragansett Bay. Qualitative and quantitative analyses of fatty acid methyl esters and hydrocarbons indicated that the influence of sewage and other pollutants is greatest in river areas. The decreasing percentages in the suspended material and sediment of 2 unsaturated and 1 monounsaturated acids from the mouths of the Providence and Taunton Rivers to the Bay, and the increasing percentage of the 4 polyunsaturated fatty acids along the same 2 transects are due to the influence of sewage effluents containing large amounts of the unsaturated acids and the relatively greater abundance of plankton species which contain polyunsaturated acids. The influence of detritus derived from terrestrial and marsh plants and resuspended sediments also tends to lower the wt percent values of the polyunsaturated acids in the suspended matter. The wt percent of the total 15-C acids remains fairly constant throughout the Bay and shows no noticeable seasonal variations. Since the 15-C acids may be the result of microbial activity, the level of these acids is possibly indicative of a fairly uniform distribution of this microbial activity throughout different portions of the Bay. There is a decreasing trend in hydrocarbon concentration in the Providence River transect, but not in the Taunton River. Results indicate a substantial petroleum hydrocarbon input at or above the 1st stations in the Providence River. There is no significant linear correlation between chlorophyll and hydrocarbon data, indicating sources other than phytoplankton for the hydrocarbons.

Citation 424

SCOTT, B. D.

Division of Fisheries and Oceanography, CSIRO, P. O. Box 21,
Cronulla, N. S. W. 2230

Phytoplankton Distribution and Light Attenuation in Port Hacking Estuary

Aust J Mar Freshwater Res

1978,29,31-44.

English

The distribution of phytoplankton in a marine dominated estuary is described in terms of in vivo chlorophyll fluorescence, phytoplankton photosynthesis rates at constant irradiance, and the attenuation of solar irradiance by the water column. The phytoplankton distribution was consistent with the physiography and water circulation in the estuary. A method is described for estimating the proportions of suspended sediments, introduced with runoff from the land, which are removed from the estuary by tidal exchange or by sinking. Estimates of the proportions of phytoplankton and detritus in the water column are derived from the relationship of chlorophyll concentration to the extinction coefficient.

Citation 425

SEABLOOM, R. W.

Washington Univ. , Seattle, WA, Coll. of Engineering

Water Pollution by Sewage from Water Craft

In: Colloque International sur l'Exploitation des Oceanis, Bordeaux, France

1971(Mar), Theme I Tome I, 13p.

English

The pollution by water craft waste discharges in Meydenbauer Bay, an inlet on Lake Washington, Wollochet Bay, a harbor on Puget Sound and San Diego Bay was investigated. Bacterial counts were taken and the ecology of the areas studied. Pollution control devices macerator-disinfectors, self contained recirculating flush toilets, incinerators, and holding tanks are some of the possibilities considered to aid in abatement of this pollution problem. International legislation and additional research to improve the technology for handling vessel waters are suggested for improvement of the present minimally adequate systems.

Citation 426

SEGAR, D. A. , A. Y. CANTILLO

National Oceanic and Atmospheric Administration, Miami, FL, Atlantic Oceanographic and Meteorological Labs

Some Considerations on Monitoring of Trace Metals in Estuaries and Oceans

In: International Conference on Environmental Sensing and Assessment. 14-19(Sept), Las Vegas, NV

1975, Vol. 1,6-5-1 - 6-5-5.

English

The trace metal chemistry of the coastal waters of New York and New Jersey in the vicinity of the Hudson-Raritan river discharge was studied. Contamination-free samples were obtained using a 'top drop' Niskin bottle and a rosette multi-sampler. Analysis was performed by flameless atomic absorption spectrophotometry. Large geographical and short-term temporal variations in dissolved trace metal content were observed. Intensive sampling in a restricted geographical area also revealed the existence of coherent cells of water which contained anomalously high metal concentrations. The geographical location of these cells suggested that they were caused by the river discharge influence and by sewage sludge or dredge spoil dumping. An appreciable fraction of the metal present in the dissolved phase of the New York Bight could not be determined by traditional analytical techniques such as solvent extraction. Continuous real-time horizontal profiling of trace metal concentrations from a moving vessel appears to be required for adequately describing the processes affecting metal introduction, transport, and removal in the area. Data on the percentage of total dissolved copper and iron which is determinable by solvent extraction and atomic absorption are presented along with vertical distributions of total zinc.

Citation 427

SENQUPTA, SUBRATA, SAMUEL S. LEE, HARVEY P. MILLER

Miami Univ. , Coral Gables, FL, Dept. of Mechanical Engineering

Three-Dimensional Numerical Investigations of Tide and Wind-Induced Transport Processes in Biscayne Bay

Miami Univ.

1978(July), SG Technical Bull. 39,137p.

English

A three-dimensional, time-dependent free surface hydrodynamic model has been developed, which takes account of topographical and meteorological parameters, for the application to sediment transport and dissolved chemical transport in the South Biscayne Bay. Local tidal effects have been introduced into the mathematical model by applying a so-called primitive numerical boundary condition at the ocean-bay interface. Agreement with a statistically averaged tide data base, both at the ocean exchange area and at several shoreline locations, for a calibrated model is quite good. Basic sediment transport processes, with associated boundary conditions, have been modelled. General features of the suspended particle sediment transport have been evaluated qualitatively, and the behavior of the dominant physical mechanisms determined. The model can be directly applied to numerical studies of nutrient, and other biochemical processes, as well as to a variety of contaminant transport studies. However, further effort is necessary to ensure quantitative agreement with respect to long-term flushing and to sediment transport.

Citation 428

SEYB, LES, KAREN RANDOLPH

Corvallis Environmental Research Lab. , OR

North American Project--A Study of U. S. Water Bodies. (A Report for the Organization for Economic Cooperation and Development)

US Environmental Protection Agency

1977(July), EPA/600/3-77/086,548p.

English

The Organization for Economic Cooperation and Development, an independent international organization for promotion of economic development in member countries, is concerned with both the qualitative and quantitative aspects of economic growth. The Environment Committee of OECD is assisted by a number of delegate groups concerned with policy development in specific sectors of the overall environmental problem. One of these groups is the Water Management Sector Group, which in 1971 established a Steering Group on Eutrophication Control to develop a series of cooperative projects for monitoring eutrophication in inland waters. The overall objective of these projects was the achievement of comparability on nutrient budgets, chemical balances, and biological productivity in water bodies. In the United States 22 waterbodies were included in the program. Final reports on the limnology of each have been compiled by the United States investigators and are contained in this publication.

Citation 429

SHABMAN, I. A. , P. M. ASHTON

Virginia Polytechnic Inst. and State Univ. , Blacksburg, Dept. of Agricultural Economics

Citizen Attitudes Toward Management of the Chesapeake Bay

WRRC Virginia (Blacksburg)

1976(Feb), VWRRC Bull. 96,69p.

English

A survey of Chesapeake Bay Residents was conducted to determine how a selected group of citizens felt about certain current issued facing the Bay. Compared with the general population, the survey respondents earned higher incomes, were more highly educated, were professionally employed, and seemed heavily involved in public service activities. They also tended to display an 'environmentalist' bias. Even so, respondents did not feel informed about the ongoing Corps Engineers study of the Bay or about the Maryland and Virginia Coastal zone management programs, which are the three major planning efforts now being conducted on the bay. Respondents expressed some mild dissatisfaction with current administrative, legal, and management programs, but expressed little desire for passage of new laws or creation of a single management agency for the Bay as a whole. While the respondents felt that the public did have reasonable access to the decision-making process, they indicated a fairly strong concern over what they saw as public apathy toward the problems of the bay. Thirteen specific Bay problems were ranked in importance by the respondents. In both states, waste disposal, bilge dumping, wetlands preservation, offshore oil development, dredge-material disposal, and power-plant siting were identified as issues of major importance. Several problems received substantially less emphasis. These included runoff of pesticides and fertilizers, shoreline erosion, population growth, and improvement of public access to the Bay. General implications drawn from these results include: (1) any organization of citizens probably will tend to represent only limited aspects of public concern, and (2) agencies should expect to deal with a less than representative socio-economic cross section of society in their public-participation programs.

Citation 430

SHAPIRO, JOSEPH, ROBERTO RIBEIRO

Johns Hopkins Univ. , Baltimore, MD, Dept. of Sanitary Engineering and Water Resources

Algal Growth and Sewage Effluent in the Potomac Estuary

J Water Pollut Control Fed

1965(July),37(7),1034-1042.

English

Addition of effluents from secondary wastewater treatment plants to Potomac River greatly increases growth of both green (chlorophytes) and blue-green algae (cyanophytes) in proportion to the quantity of effluent added. As little as 5% effluent is effective, and 40% is not supraoptimal. Since cyanophytes are able to provide their own nitrogen supply through fixation of molecular nitrogen, phosphate is the sole nutrient responsible for limiting their growth. Chlorophytes require both phosphate and ammonium-nitrogen for growth. Removal of ammonia from effluents will control chlorophytes only, but phosphate removal will limit cyanophytes as well. Partial removal of phosphorus from effluents will control both algal groups to a degree commensurate with extent of removal. Normal phosphorus concentrations of the Potomac River are such that increases in these concentrations will stimulate further algal growth. The hypothesis that trace substances are not limiting was verified. Silt, affecting light penetration and adsorption of phosphates or ammonia onto silt particles may both lead to reduced algal growths. Solution of the silt problem, through building dams, must be tied to programs for nutrient control.

Citation 431

SIMIDU, USIO, EMIKO KANEKO, NOBUO TAGA

Ocean Research Institute, University of Tokyo, Minamidai, Nakano-ku, Tokyo, Japan

Microbiological Studies of Tokyo Bay

Microb Ecol

1977,3,173-191.

English

The generic composition of the heterotrophic bacterial population of Tokyo Bay, which is now highly polluted and eutrophic, was compared with that of the adjacent, less polluted regions of Sagami Bay and Suruga Bay. Members of Vibrionaceae predominated in the bacterial flora of seawater and zooplankton samples from Sagami Bay, Suruga Bay, and the mouth of Tokyo Bay. However, Vibrio spp. formed only a small proportion of the bacterial population of the water and sediment samples from the inner Tokyo Bay; there the Gram-negative, nonmotile, nonpigmented bacteria, which were tentatively identified as Acinetobacter, were predominant. The result of experiments, in which seawater samples from Tokyo Bay were incubated under various experimental conditions, indicated that two significant factors apparently control the growth of Vibrio spp. in seawater; (1) a direct antagonism between Vibrios and phytoplankton undergoing rapid growth, and (2) a limiting organic nutrient for Vibrios.

Citation 432

SIMMONDS, M. A.

Consulting Chemical Engineer, 82 Central Avenue, St. Lucia, Queensland 4067, Australia

Experience with Algal Blooms and the Removal of Phosphorus from Sewage

Water Res

1973(Feb),7(1/2),255-264.

English

Based upon observations of algal blooms in water treatment plants during the period 1930-1940 when phosphate occurred primarily from natural sources, the conclusion is made that the mechanism which triggers algal blooms may be neither nutrient concentration nor the concentration of organic matter. Instead the pH, alkalinity, carbon dioxide equilibrium condition is a major factor, not only in promoting, but also in maintaining algal blooms. The mechanism involved is the conversion of bicarbonates to carbonates at high pH and the consequent release of carbon dioxide which is utilized by algae. Use of algae for removing phosphates from sewage sludge is discussed. Algae were capable of removing large amounts of phosphate, but were themselves difficult to remove from the sewage.

Citation 433

SIMON, J. L. , W. H. HUANG

University of South Fla. , School of Natural Scienes, 4202 E. Fowler Ave. , Tampa, FL 33620

Effects of Sewage Pollution Abatement on Hillsborough Bay

research still in progress

English

Objectives: Owing to the construction of a large municipal advanced (tertiary) waste treatment plant, a unique opportunity exists to study the effects of removal of a major source of pollution on the estuarine environment. The objectives of the present proposal are to provide pre-advanced treatment data on (1) water quality; (2) sedimentary parameters and sediment chemistry; (3) benthic infaunal invertebrate assemblages in Hillsborough Bay. (4) An attempt to correlate the distribution of the benthic invertebrates with water quality and sedimentary parameters will be made, with an eye toward predicting what effects changes in water or sediment parameters as a result of tertiary treatment might be.

Citation 434

SINCLAIR, MICHAEL, EDRIC KEIGHAN, JERRY JONES

Section d'Oceanographie, Universite du Quebec a Rimouski,
Rimouski, Que. G5L3A1

ATP as a Measure of Living Phytoplankton Carbon in Estuaries

J Fish Res Board Can

1979,36,180-186.

English

An attempt has been made to evaluate the accuracy of ATP as a measure of living phytoplankton carbon in estuaries. Phytoplankton carbon estimated from ATP was compared to estimates from cell counts. In high biomass samples the agreement between the two estimates was quite good. In the low biomass samples the cell count method underestimated phytoplankton carbon relative to the ATP estimate. This was interpreted to be due in part to low cell counts in these samples. Contamination by microzooplankton (essentially only tintinnids) was, in 14 out of the 18 samples, <3% of the ATP estimated carbon. However, it was as high as 19% in one case. In the lowest biomass samples (<0.5 ug chlorophyll a/L) bacterial populations may contribute as much as 50% of the total living carbon. It is concluded that, with caution, ATP is a useful measure of living phytoplankton carbon in estuaries during periods of moderate to high biomass (>1 ug chlorophyll a/L for the St. Lawrence). Since carbon to chlorophyll ratios in the high biomass samples varied considerably, a constant ratio appears inapplicable for transforming chlorophyll to carbon.

Citation 435

SINHA, EVELYN

P. O. Box 989, La Jolla, CA 92037

Coastal/Estuarine Pollution, an Annotated Bibliography

Ocean Engineering Information Series

1970, Vol. 3,87p.

English

This bibliography, intended as a guide in interdisciplinary studies of pollution in the coastal zone contains 631 informative abstracts of literature providing substantial scientific and technological information on: the detection, identification, measurement and analysis of parameters of pollution and pollutants; sources of pollution; coastal and estuarine processes; effects of pollution; water quality management and waste heat utilization. A bibliography of bibliographies, separate identification of theses, books, patents, and detailed subject and author indexes are included. Represented are sources found in 111 journals, some 32 national and international conferences and symposia, governmental research and development reports, institutional studies and industrial contract reports. Coverage includes 1965 to May 1970.

Citation 436

SINHA, EVELYN

Ocean Engineering Information Service, P. O. Box 989, La Jolla, CA 92037

Methods, Models & Instruments for Studies of Aquatic Pollution, An Annotated Bibliography

Ocean Engineering Information Series

1971, Vol. 5,29p.

English

This bibliography contains 204 abstracts of literature providing substantial scientific and technical information on methods, models and instruments used in studies of aquatic pollution and means of abatement. These deal with the detection, identification and measurement of the parameters of pollution, biotic constituents, detergents and nutrients, pesticides, oil, metals, and non-metallic toxicants. Various aspects of water quality management are encompassed. Pertinent patents, a bibliography of bibliographies, a subject outline, a keyterm index, and an index citing all authors and co-authors are included. Although intended as a supplement to Vol. 3, Coastal/Estuarine Pollution and Vol. 4, Lake and River Pollution of the Ocean Engineering Information Series, it is independently useful for field and laboratory investigations of aquatic pollution.

Citation 437

SLOTTA, L. S. , SCOTT M. NOBLE

Oregon State University, Ocean Engineering, Corvallis, OR 97331

Use of Benthic Sediments as Indicators of Marina Flushing

Oregon State Univ.

1977(Oct), ORESU-T-77-007,56p.

English

This report presents the findings of a sediment analysis program formulated to determine the flushing potential of various shaped small boat basins. Chemical tests regarding volatile solids, Kjeldahl nitrogen, grease and oil, and sulfides were performed with the results compared to established sediment quality criteria. These results were used in normalizing laboratory test results into pollution indexes. The marinas were characterized via dimensionless numbers composed of several physical parameters indicative of the basin's geometry on which the flushing ability of estuarine and riverine enclosures might depend. From a general statistical examination of the benthic sediment quality data, models were developed representing sediment quality indexes and flushing phenomena. Comparing the relative differences in pollution indexes between stations in one basin provided useful information concerning the confidence that can be regarded about assumptions made in the problem solving technique. Five dimensionless basin parameters were assigned limiting values that were felt optimum to obtain adequate flushing for marina basins. A nomogram for use in the design process for marina sitings was developed. Using this tool one can predict where adequate flushing of enclosed basins would be ensured with the effect that existing water quality would be high.

Citation 438

SMITH, B. N.

Texas Univ. , Austin Dept. of Botany

The Role of Sea Grasses and Benthic Algae in the Geochemistry of Trace Metals in Texas Estuaries

Texas Univ.

1974(Oct), Completion Rep. OWRT B-175-TEX(1),6p.

English

A model was proposed and evaluated for trace metal accumulation in marine plants growing under changing environmental conditions. Monthly collections were made at 22 stations in estuaries near Corpus Christi. The results revealed significant fluctuations in the concentration of Cd, Co, Cu, Mn, Ni, and Zn in sea water and in the accumulation of these trace metals in benthic plants. A mathematical relationship was determined between the accumulation of metals in benthic plants and the concentration of metals in sea water, a relationship remaining consistent for several metals and all plants tested. Finally, an interpretation of the above relationship revealed a better understanding of the significance of the Irving-Williams order of complex stability to the biogeochemistry of metals.

Citation 439

SMITH, ERIC M. , CHARLES P. GERBA, JOSEPH L. MELNICK

Department of Virology and Epidemiology, Baylor College of Medicine, Houston, TX 77030

Role of Sediment in the Persistence of Enteroviruses in the Estuarine Environment

Appl Environ Microbiol

1978(Apr),35(4),685-689.

English

The survival of four enteroviruses commonly found in sewage effluents was examined when the viruses were adsorbed to marine sediments in estuarine water and compared with virus survival in estuarine water alone. Echovirus 1, coxsackieviruses B3 and A9, and poliovirus 1 survived longer when associated with marine sediment. When the estuarine water was polluted with secondarily treated sewage effluent, virus survived for prolonged periods in sediments, but not in the overlaying estuarine water.

Citation 440

SMITH, K. L. , JR. , GILBERT T. ROWE, JEAN ANN NICHOLS

Woods Hole Oceanographic Institution, Woods Hole, MA 01543

Benthic Community Respiration Near the Woods Hole Sewage Outfall

Estuarine Coastal Mar Sci

1973,10,65-70.

English

Effects of the Woods Hole, Massachusetts sewage outfall on the surrounding benthic community were examined. In situ oxygen measurements of the sediment were made before and after treatment with antibiotics and formalin. Total oxygen consumption was 67.8 ml O2 m-2h-1 of which 15.0 ml O2 m-2h-1 was attributable to the chemical demand of the sediment. Community respiration was 52.8 ml O2 m-2h-1 with bacterial respiration representing 34% of the biological demand. Total oxygen uptake, chemical demand and bacterial respiration were significantly higher than values obtained in the control area in Buzzards Bay. Macrofaunal and meiofaunal-microfloral-microfaunal respiration were estimated from structural data and the literature. Utilization and accumulation of organic enrichment is discussed.

Citation 441

SMITH, R. E.

California State Univ. , San Jose, CA, Dept. of Natural Science

The Hydrography of Elkhorn Slough, a Shallow California Coastal Embayment

Moss Landing Marine Laboratories, Moss Landing Harbor, CA

1973, Technical Pub. 73-2,88p.

English

From October 1970 through February 1972, temperature, salinity, dissolved oxygen, secchi depth, and five major nutrients were observed at approximately monthly intervals at Elkhorn Slough and Moss Landing Harbor. In addition, similar hourly observations were made during two tidal studies during the wet and dry seasons. From the salinity measurements during the summer, a salt balance for Elkhorn Sough was formulated and mean eddy diffusion coefficients were determined. The diffusion model applied to longitudinal phosphate distributions yielded a mean diffusive flux of 12 kg PO4/day (140 micrograms/sq m/day) for the area above the mean tidal prism. Consistent differences, apparently due to differing regeneration rates, were observed in the phosphate and nitrogen distributions. Bottom sediments were proposed as a source for phosphate and as a sink for fixed nitrogen. Dairy farms located along central Elkhorn Slough are apparently a source for reduced nitrogen. During summer, nitrogen was the limiting nutrient for primary production in the upper slough. Tidal observations indicated fresh water of high nutrient concentration consistently entered the harbor from fresh water sources to the south. This source water had a probable phosphate concentration of 40 to 60 micrograms/l and a seasonally varying p: n ratio of 1:16 and 1:5 during the winter and summer, respectively. Net production and respiration rates were calculated from diurnal variations in dissolved oxygen levels observed in upper Elkhorn Slough. Changes in phosphate associated with the variations in oxygen were close to the accepted ratio of 1:276 by atoms.

Citation 442

SMITH, WILLIAM G. , DAY, JOHN W.

Louisiana State University, Louisiana Water Resources Research Institute

Enrichment of Marsh Habitats with Organic Wastes

WRRI Louisiana

1973 (Nov), OWRR A-033-LA, 7 p.

English

Municipal and industrial wastewater have created local problems, including eutrophication, plant nutrient loss, discharge-induced die-off of algal flora, and changes in chemical and biological character. Among methods used to solve these problems is that of overland runoff, and the project is an attempt to incorporate this method into an estuarine environment. A site in the subtropical coastal marsh at Dulac, Louisiana, home port facility for a menhaden processor, was selected: an artificially enclosed freshwater marsh, totaling about two and one-half square miles. Soil chemistry core samples were taken along the length of the marsh spoil apron every 75 ft. Measurements on extractable cations reveal the effects of continuous effluent application. Sampling stations for aquatic analysis, soil sampling, and microbial sampling are spaced at intervals from the points of wastewater discharge. Both general heterotrophic bacteria and proteolytic microbes are being measured at the same sites. The overall efficiency of land runoff in reducing the waste load should be reflected in the chemical oxygen demand and the total organic carbon at the sampling sites.

Citation 443

SMYTH, J. C. , D. J. CURTIS, I. GIBSON, M. WILKINSON

Department of Biology, Paisley College of Technology, 41B Mossvale Street, Paisley, Scotland

Intertidal Organisms of an Industrialized Estuary

Mar Poll Bull

1974,5(12),188-191.

English

A study of the intertidal organisms of the Clyde Estuary is being undertaken to assess the effects of changing levels of pollution and to relate to these and other changes the distribution of important winter flocks of waders and ducks.

Citation 444

SOERENSEN, J.

Univ. of Aarhus, Inst. of Ecology and Genetics, Ny Munkegade, DK-8000 Aarhus C, Denmark

Capacity for Denitrification and Reduction of Nitrate to Ammonia in a Coastal Marine Sediment

Appl Environ Microbiol

1978(Feb),35(2),301-305.

English

The capacity for dissimilatory reduction of NO-1 to N2(N2O) and NH4+ was measured in N15-NO3- amended marine sediment. Samples were taken in the Limfjorden, Denmark. Incubation with acetylene (7x10-1 atm (normal)) caused accumulation N2O in the sediment. The rate of N2O production equaled the rate of N2 production in samples without acetylene. Complete inhibition of the reduction of N2O to N2 suggests that the "acetylene blockage technique" is applicable to assays for denitrification in marine sediments. The capacity for reduction of NO3- by denitrification decreased rapidly with depth in the sediment. The capacity for reduction of NO3- to NH4+ was significant also in deeper layers. The latter process may be equally as significant as denitrification in the turnover of NO3- in marine sediments.

Citation 445

SOROKIN, YU. I. , I. W. KONOVALOVA

Institute of Biology of Inland Waters, Academy of Sciences USSR, Borok, Yaroslavl

Production and Decomposition of Organic Matter in a Bay of the Japan Sea during the Winter Diatom Bloom

Limnol Oceanogr

1973(Nov),18(6),962-967.

English

The winter bloom of diatoms studied under the ice of a bay in the Japan Sea consisted mainly of species of Thalassiosira and Chaetoceros, having a low temperature optimum (9 C) for photosynthesis and a low optimum of illumination (2 klux). Photosynthesis proceeded to 8-15 m in water under the ice at -1.8 C. The cause of the bloom is related to optimal illumination and nutrient supply during this period. Microbial biomass was sufficiently high to sustain the normal feeding on zooplankton. Thus, an active process of biological production takes place there even in winter at subzero temperature.

Citation 446

SOULE, DOROTHY F. , M. OGURI, JOHN D. SOULE

University of Southern California, Los Angeles, CA, Inst. for Marine and Coastal Studies

You Can Tailor Effluent BOD to Fit the Receiving-Water Ecosystem. . . and Enhance the Environment. Urban and Fish-Processing Wastes in the Marine Environment: Bioenhancement Studies at Terminal Island, California

Bull Calif Water Pollut Contr Assoc

1978(July),15(1),58-63.

English

Coastal marine waters, among the richest ecosystems in existence, are largely dependent upon nutrients of terrestrial origin. Where man has reduced or eliminated marshlands and river flow, urban sewage systems offer virtually the only nutrient source for sustaining diverse marine life. Studies at Terminal Island, California indicate that domestic sewage and fish-processing effluents supplied large organic molecules (proteins, amino acids, carbohydrates and fats) which enhanced the environment as they were recycled through the food chain or web. Methods were being developed for managing the levels of oxygen demand in the waste load, according to the assimilation capacity of the receiving waters, rather than destroying the nutrients by feeding only bacteria in secondary waste-treatment plants. The residual nutrients in the wastes after secondary treatment do not support the same diverse ecosystem, and depletion of biota may result. Rather, emphasis should be placed on point-source control and removal of toxicants without depriving the coastal organisms of their historic nutrient supply. In the future, energy-rich effluents should be used by developing alternative methods for waste management and new regulatory concepts, rather than imposing traditional secondary treatment.

Citation 447

SOULE, DOROTHY F. , MIKIHIKO OGURI

University of Southern California, Los Angeles, CA, Inst. of Marine and Coastal Studies

Marine Studies of San Pedro, California. Part 12: Bioenhancement Studies of the Receiving Waters in Outer Los Angeles Harbor

Sea Grant Program

1976(Dec), Rep. No. USC-SG-5-76,284p.

English

Field studies indicated that the present state of the harbor is healthy. Rich and diverse biotic elements are supported by the present environmental regime. Episodes of stress, which occurred in earlier years, as indicated by reduced levels of dissolved oxygen, have not been noted since the canneries have instituted improved waste management procedures. Bioenhancement is occurring in outer Los Angeles Harbor, due at least in part to the presence of natural waste effluents. Bioenhancement has been evaluated in terms of numbers of organisms and species diversity of plankton, benthic organisms, and standing crop of fish, as well as in biomass and a number of other factors. Under present conditions, a small zone within approximately 200 feet of the outfalls exists where numbers of species are low. Adjacent to this zone is a zone of enrichment which extends through most of the outer harbor. Beyond that, conditions return to average coastal populations. The regulation of waste loading and control of pollutants in the past six-year period has brought the harbor ecosystem from a depauperate biota to a moderately rich one in the immediate outfalls zone, with a very rich biota in the adjacent outer harbor area.

Citation 448

SPECHT, D. T.

Eutrophication and Lake Restoration Branch, Corvallis Environmental Research Center, Corvallis, OR

Seasonal Variation of Algal Biomass Production Potential and Nutrient Limitation in Yaquina Bay, Oregon

In: Proceedings Biostimulation and Nutrient Assessment Symposium, Utah State Univ. , Logan, UT

1975(Sept), PRWG168-1,149-174.

English

The use of the MAAP nutrient bioassay has shown that the potential nutrient limitation and biomass potential in the Yaquina estuary, Oregon, changes with hydrological and precipitation changes associated with seasonal cycles. The maximum sensitivity of the estuary to the addition of nutritive wastes appears to be in the late spring and summer months. This is at a time when the light and temperature potential are highest, permitting the maximum exploitation of the nutrients by algae. Nutrient bioassays show that the addition of either phosphorus or nitrogen or both can stimulate algal growth depending on the point of introduction and time of season or day. Because of this, serious consideration should be made for the removal of both nutrients from sewage effluents or other pollutant sources before disposal into estuaries or their tributaries. The utility of Selenastrum capricornutum Printz, the AAP freshwater test species, is described as an assay organism for low salinity brackish waters.

Citation 449

SPIKER, E. C.

Carbon Isotope Distribution in Eutrophic Potomac River Estuary

American Geophysical Union, Spring Meeting, Miami Beach, FL 17-21 (Apr) 1978

1978,782 2126.

English

Citation 450

STANLEY, DONALD W. , JOHN E. HOBBIE

North Carolina Water Resour. Res. Inst. , Raleigh, N C

Nitrogen Recycling in the Chowan River

WRRI North Carolina

1977, UNC-WRRI-77-121,142 p.

English

The repeated occurrence of nuisance algal blooms in the Chowan River during the past few summers may have been caused by increased nitrogen loading in the river. That possibility prompted this study of the relationship between nitrogen and algal growth in the river. The lower Chowan River, located in northeastern North Carolina, is actually a freshwater tidal estuary emptying into Albemarle Sound. As is typical for this region, dissolved inorganic nitrogen concentrations in the Chowan are high in winter and low in summer. This pattern results from a combination of high rates of input from land runoff in the winter and high rates of removal by rapidly growing algae in the summer. Dissolved organic nitrogen is the most abundant form of nitrogen in the river, and the concentrations decrease down-river, suggesting that it is transformed to other forms within the river. Annual algal production in the river was around 100 g C. m-2, over 90% of which occurred between May and October, a period when blue-green, dinoflagellate and green algae made up most of the algal biomass. Annual inorganic nitrogen uptake, measured by 15N isotope techniques, was 33 g NH4-N m-2 and 12 g NO3-N m-2. Carbon-nitrogen ratios calculated from these data are low, probably because of nitrogen assimilation by bacteria in the samples and because of luxury uptake of nitrogen by the phytoplankton. During winter rapid flushing rates, low light intensities, and low temperatures are the most important factors limiting algal photosynthesis and nitrogen uptake in the river. During summer inorganic nitrogen became limiting as nitrate and ammonia levels fell below 50 ug N liter-1, the concentration found necessary for maximum uptake. However, rapid regeneration of ammonia permitted rapid algal growth throughout the summer despite the low concentrations.

Citation 451

STAUBLE, JANE F. , DOUGLAS H. WOOD

Virginia Institute of Marine Science, Gloucester Pt. , VA 23062

The Chesapeake Bay Bibliography, Vol. 3, Maryland Waters

VIMS

1975(Jan), Special Sci. Rep. No. 73.

English

This work is the second continuation and enlargement of the Chesapeake Bay Bibliography. This, the third volume, is devoted largely to materials focused on the Maryland(upper half) waters of the Bay, though articles of bay-wide interest are included. Our primary purpose remains to develop a comprehensive research and information services program for those interested in management of and research on the environments and resources of the Bay region.

Citation 452

STEED, DAVID L. , B. J. COPELAND

The University of Texas Marine Science Institute at Port Aransas, TX

Metabolic Responses of Some Estuarine Organisms to an Industrial Effluent

Texas Insti Mar Sci, Contributions

1967,12,143-159.

English

The oxygen consumption rates of several species of estuarine organisms were measured in various concentrations of a petrochemical company effluent. Test solutions used were of concentrations less than the TLm value, as determined by the toxicity bioassay method. It was learned that both short-term and chronic exposure exert stress conditions causing organisms to experience changes in metabolic requirements. A typical response was a decreased metabolic rate in low concentrations and an increased rate upon prolonged exposure or in concentrations approaching the TLm value. However, responses may vary with the type effluent used, length of exposure and with the particular species under study. These data were interpreted with respect to the ecological requirements of individual organisms and entire populations. It is apparent that populations may experience gross deleterious effects, without apparent "fish kills, " under what may normally be interpreted to be "safe" pollution levels.

Citation 453

STEELE, J. H. , I. E. BAIRD

Marine Laboratory, Aberdeen

Relations between Primary Production, Chlorophyll and Particulate Carbon

Limnol Oceanogr

1961,6(1),68-78.

English

In two very different areas in the North Sea, Aberdeen Bay (7 m) and the Fladen Ground (140 m) seasonal cycles of C14 uptake, chlorophyll and particulate organic carbon were observed. The ratios of C14 uptake to chlorophyll concentration showed marked variations seasonally. There were no signs of "dead" chlorophyll or of a decrease in the ratio due to nutrient deficiency. The ratios of chlorophyll to particulate carbon suggest that in coastal waters living plants generally form the most important part of the particulate carbon. At the deeper position the ratio was much smaller so that chlorophyll is not a good index of organic matter in the water.

Citation 454

STEELE, J. H. , I. E. BAIRD

Marine Laboratory, Aberdeen

Further Relations between Primary Production Chlorophyll, and Particulate Carbon

Limnol Oceanogr

1962,7(1),42-47.

English

The productivity of a sea loch, Loch Nevis, on the west of Scotland, is estimated from nitrate and phosphate data. These results show that even though the nitrate/phosphate ratio in the water is never more than 10:1 (by atoms) and is less than 1:1 in the euphotic zone in summer, the assimilation and regeneration ratio of these elements is always close to the "normal" ratio of 16:1. Chlorophyll a and particulate organic carbon data are used to study the possible carbon/chlorophyll ratios in the plants. During the summer the ratio is calculated to be 74:1 and the remaining data suggest lower values for spring and autumn. For a different area, the northern North Sea, carbon and chlorophyll samples during the spring flowering provide an estimated value of 23:1 for the carbon/chlorophyll ratio under very favorable conditions for growth. The possible causes of the differences between the carbon/chlorophyll ratios for Loch Nevis and the northern North Sea are discussed.

Citation 455

STEVENSON, J. COURT, NEDRA M. CONFER

University of Maryland, Horn Point Environmental Laboratories, Box 775 Cambridge, MD 21613

Summary of Available Information on Chesapeake Bay Submerged Vegetation

Univ. of Maryland

1978(Aug), FWS/OBS-78/66.

English

There are approximately eleven species of submerged aquatic vegetation (SAV) dominant in the waters of the Chesapeake Bay. Included in this group and discussed in this technical document are: Potamogeton perfoliatus - redhead grass, Ruppia maritima - widgeon grass, Myriophyllum spicatum - Eurasian watermilfoil, Zostera marina - eelgrass, Potamogeton pectinatus - sago pondweed, Zannichellia palustris - horned pondweed, Vallisneria americana - wildcelery, Elodea canadensis - common elodea, Chara spp. - muskgrass, Ceratophyllum demersum - hornwort or coontail, Najas spp. - naiads. Submerged aquatic species tend to inhabit the shallow, shoreline areas of the Bay and its subestuaries, primarily limited to depths of three meters or less. Species vary as to salinity and temperature tolerances, morphology, preferred bottom substrate, susceptibility to chemical pollutants and general distribution. In order to determine the probable cause or causes for the changing patterns in submerged vegetation, the various factors that are known to affect the grasses have been analyzed to the extent possible given the availability of published and unpublished literature. Included among these factors are: agrochemicals, turbidity, salinity, temperature, pH, wave action, fauna, epiphytes, bicarbonate ion, chlorine, disease, boat traffic, dredging, nutrient loading, petroleum and heavy metals. In order to assess these impacts and correlate them to a Baywide decline in submerged grasses, environmental factors can be initially separated into short-term, localized impacts or factors that impact the Bay as a whole or on an aggregate basis such as the upper, middle or lower Bay areas. (abbrev. summary)

Citation 456

STEVENSON, L. HAROLD, R. R. COLWELL

Estuarine Microbial Ecology

Belle W. Baruch Symposium in Marine Sciences, 1st. ,
University of South Carolina Press, Columbia, SC

1973,536p.

English

The symposium contains papers given by participants on microbes, their ecology in estuarine habitats. Contributions were ordered into nine sections: 1. Introduction, 2. Techniques, 3. Heterotrophic Activity, 4. Environmental Effect, 5. Applied

Estuarine Microbiology, 6. Phytoplankton, 7. Fungi, 8. Microbe-Animal Interactions, 9. Summations.

Citation 457

STEWART, R. KEITH, WILLIAM MARCUS INGRAM, KENNETH M. MACKENTHUM, ET AL.

Robert A. Taft Sanitary Engineering Center, Cincinnati, OH

Water Pollution Control, Waste Treatment and Water Treatment, Selected Biological References on Fresh and Marine Waters

Federal Water Pollution Control Administration

1966, Publication No. WP-23,126p.

English

This bibliography of selected references on water pollution control, waste treatment and water treatment, revises and updates earlier publications on various aspects of water pollution biology (Public Health Service Publications No 214 and 1053, and Technical Report No W-61-4). Most references in the previous publications have been retained in this book, and selected references from 1962 through 1965 have been added. The revisions and additions and the expansion to include the marine aspects with those of fresh water should be helpful in providing source material under one cover for those engaged in the study of pollution as related to aquatic life.

Citation 458

STIRLING, HADRIAN P. , ANN P. WORMALD

Fisheries Research Station, Aberdeen, Hong Kong

Phosphate/Sediment Interaction in Tolo and Long Harbours, Hong Kong, and its Role in Estuarine Phosphorus Availability

Estuarine Coastal Mar Sci

1977,5,631-642.

English

The phosphate adsorption capacities of estuarine sediments and sediment derived from reclamation works in Tolo Harbour were determined in seawater. The influences of temperature and pH were not important in the field, but large reductions in salinity following heavy rain enhance phosphate adsorption. Most sediments exhibited a saturation point with increasing sediment concentration, beyond which there was little further adsorption. At these saturation concentrations, estuarine sediments adsorbed 71-88% of added phosphate up to at least 100 ug P l-1, while reclamation sediment adsorbed 95%. There was significantly less adsorption from higher concentrations up to 2 mg P l-1. Adsorption capacity appeared to be related to the kaolinite content of the sediments. Laboratory and field observations showed that adsorption is reversible and the sediments act as a phosphate buffer, but the steady state value is 3-9 ug P l-1 so desorption can occur only into unpolluted waters. These results contrast with rather higher equilibrium levels observed elsewhere. In polluted waters the sediments, especially those from land reclamation, permanently remove a large proportion of dissolved phosphate so that the danger of eutrophication should be reduced.

Citation 459

STOCKNER, J. G. , A. C. COSTELLA

Fisheries and Marine Service, West Vancouver (British Columbia), Pacific Environment Inst.

Marine Phytoplankton Growth in High Concentrations of Pulp Mill Effluent

J Fish Res Board Can

1976(Dec),33(12),2758-2765.

English

Axenic culture studies with the marine phytoplankton Skeletonema costatum, Dunaliella tertiolecta, and Amphidinium carteri demonstrated the ability of these species to adapt to and exhibit normal growth in relatively high concentrations of pulp mill effluent. Skeletonema costatum and A. carteri required a preadaptation period prior to commencement of exponential growth in high concentrations of kraft effluent (20-30%), while D. tertiolecta exponential growth in 90% kraft effluent with no requirement for preadaptation. Of six pulp mill effluent types tested, kraft was considered most inhibitory to growth, while combined kraft and newsprint effluent passed through an XAD-8 resin column was least inhibitory. The effects of the six effluent types on lag, exponential, and stationary growth phases are discussed in relation to in situ concentrations and relative ecological significance in the coastal marine environment.

Citation 460

STOCKNER, JOHN G. , DAVID D. CLIFF

Department of Fisheries and Oceans, Pacific Environment Institute, West Vancouver, BC V7V 1N6

Phytoplankton Ecology of Vancouver Harbor

J Fish Res Board Can

1979(Jan),36(1),1-10.

English

Phytoplankton production and distribution were examined over a 2-yr period in the Burrard Inlet system, which includes a true fiord (Indian Arm), a shallow blind inlet (Port Moody Arm), and a turbulent narrows region that is continuous to the Port of Vancouver. Greatest annual production occurred in Port Moody Arm with a mean of 532 g C m-2 yr-1 while the lowest values were in Indian Arm and the Narrows region, averaging about 260 g C m-2 yr-1. Nitrate and zooplankton grazing were the main factors limiting phytoplankton production in Indian Arm, while flushing and poor light conditions influenced phytoplankton growth in the Narrows and outer Burrard Inlet. Most of the discharges of domestic and industrial wastes have been diverted to the Fraser River, and Vancouver Harbor can be considered relatively clean and pollution-free because of strong tidal mixing and seaward flushing. The only sign of eutrophication in the inlet is in Port Moody Arm where sufficient nutrients from sewage discharges and a relatively stable mixed-layer depth create near optimal conditions for phytoplankton growth. Daily production here is among the highest recorded in the literature for Pacific coastal marine waters.

Citation 461

STOICOVICI, LUCIA

Cent. Rech. Biol. Str. Republicii 48, Cluj-Napoca, Rom.

Interdependency between Species, Phytocenoses and the Substrate in Oligotrophic and Eutrophic Marshes

Rev Roum Biol

1978,23(1),11-16.

French

An effort is made to prove the dependence between the chemical components N, P, K and Ca of plants (Scirpus sylvaticus, Betula pubescens, Pinus sylvestris, Vaccinium myrtillus, Equisetum fluviatile, Carex nigra, C. appropinquata, C. limosa, Menyanthes trifoliata, Salix repens) and the substrate (peat) in oligotrophic and low marshes. A direct relationship is found between total N and Ca, but not for P and K when considered as limiting factors in oligotrophic marshes. In certain phytocenoses, significant differences were found when crude N and C ashes of the areal parts were related to a unit of surface.

Citation 462

STRASKRABA, MILAN

Hydrobiological Laboratory of the Botanical Institute, Czechoslovac Academy of Sciences, CS-15105 Prague (Czechoslovakia)

Natural Control Mechanisms in Models of Aquatic Ecosystems

Ecol Model

1979,6,305-321.

English

Based on cybernetic categories of natural control mechanisms, four generations of ecosystem models are distinguished: feed-forward, feedback, self-adaptation and self-organization models. The analysis of the natural control mechanisms in aquatic ecosystems suggests that different processes are controlled in different ways, and, although the four mechanisms were identified in historical sequence, they all operate simultaneously. The concept of self-organization of an ecosystem is introduced and specified for a model of an aquatic pelagic ecosystem. The concept of the ecosystem as a multilayer, multigoal and multiechelon hierarchical system with hierarchy of the levels of biological organization is also introduced.

Citation 463

STUMM, W.

Swiss Federal Inst. of Technology, Leonhardstrasse 33, ; 8006 Zuerich, Switz.

Man's Acceleration of Hydrogeochemical Cycling of Phosphorus: Eutrophication of Inland and Coastal Waters

Water Pollut Control

1975,74 (2),124-133.

English

Relevant, regulatory factors of nutrient composition and productivity are discussed, and the civilizatory impact on terrestrial and oceanographic transformations are reviewed to establish corrections between a real nutrient loading of lakes and their enrichment as a function of lake specific variables (depth, retention time, mixing, etc.). Such correlations help quantifying measures for lake restoration. The effects of the mining of P on the ecological balance of inland waters, estuaries, and coastal marine waters are examined.

Citation 464

STUMM, W.

Eidgenoessische Anstalt fuer Wasserversorgung, Abwasserreinigung und Gewaesserschutz, Zurich (Switzerland)

The Acceleration of the Hydrogeochemical Cycling of Phosphorus

Water Res

1973(Feb),7(1/2),131-144.

English

By mining phosphorus in progressively increasing quantities, man disturbs the ecological balance and creates undesirable conditions in inland waters, estuaries and coastal marine waters. The civilizatory increase in phosphorus supply to the oceans although of little consequence to the oxygen reserves of the deep sea, augments markedly the marine environments with intermittent or permanent oxygen deficient conditions. Because most aquatic food resources are produced in estuaries and coastal areas, the deterioration in water quality of these regions decreases the potential harvest of marine animal protein. Present agricultural practice of excessively fertilizing land needs to be reexamined; present agricultural technology must not without modification be exported to tropical areas. Present drainage systems for sewage, industrial wastes and storm water runoff accelerate the transport of nutrients and other pollutants to the rivers and the sea; waste plants are remarkably inefficient in mitigating this civilizatory flux.

Citation 465

SUTCLIFFE, W. H. , JR.

Bedford Inst. , Dartmouth (Nova Scotia), Marine Ecology Lab.

Some Relations of Land Drainage, Nutrients, Particulate Material, and Fish Catch in Two Eastern Canadian Bays

J Fish Res Board Can

1972,29(4),357-362.

English

In preliminary investigations on primary productivity and nutrient features of St. Margaret's Bay, Nova Scotia, water samples were collected from September 1968 through August 1969 at approximately 2-week intervals and filtered through 0.45 micron membrane filters for ATP analysis or through 0.8 micron silver filters for particulate carbon and nitrogen determinations. For size fractionation, some samples were first poured through 10 micron nylon mesh or through a 5 micron silver filter with 50% retention effective at about 8 microns and 2 micron, respectively. ATP samples were frozen immediately; samples for particulate carbon were vacuum desiccated. Laboratory analysis showed a large portion of living material less than 8 microns in size; the bacterial fraction is likely underestimated. The carbon content of living and carbon and nitrogen content of nonliving suspended particulate material for the year is given. The nitrogen budget is compared with the carbon-nitrogen ratios and nutrient data from other sources. Positive correlations between runoff and catch of four commercially important species points to importance of runoffs. Correlations between the physical parameters and biological production do not suggest simple control.

Citation 466

SZYPER, JAMES P. , JED HIROTA, JOHN CAPERON, DAVID A. ZIEMANN

University of Hawaii, Department of Oceanography, Honolulu, HA 96822

Nutrient Regeneration by the Larger Net Zooplankton in the Southern Basin of Kaneohe Bay, Oahu, Hawaiian Islands

Pac Sci

1976,30(4),363-372.

English

Four experiments were performed during February 1974 with mixed zooplankton collected with 0.33-mm mesh in the southern basin of Kaneohe Bay. The mean specific excretion rates multiplied by the estimated average standing stocks of the animals gave estimates of addition to the bay waters of ammonia, phosphate, dissolved organic nitrogen, and dissolved organic phosphorus of 38.6,4.0,23.7, and 3.2 ng-at/liter/day, respectively. The specific excretion rates were not significantly affected by the concentrations of animals in experimental vessels, by the estimated concentrations of food in the environment on the days of the experiments, nor by incubation periods of up to 4.5 hours. The rates are comparable to those obtained from zooplankton of this general size in environments that have rather different temperature and food levels, indicating that size-dependent metabolic rates are the major determinant of specific excretion rates, although feeding and temperature can affect the results of experiments. Two collecting devices, a conical net and a purse seine made of the same plankton mesh, were used to assess possible effects of capture on the results. The animals from the net hauls excreted phosphate more slowly and dissolved organic nitrogen more rapidly than did those from the seine catches, possibly as a result of the greater initial crowding of animals in the cod-end jar of the towed net. There was no evidence that animals were damaged by collection and no observable effect of initial shock. Although principally carnivorous, the animals in these experiments (60 to 70 percent Sagitta) processed dietary nitrogen and phosphorus in a way similar to that of the mainly herbivorous Calanus; they constructed body tissue that was richer in nitrogen relative to phosphorus than was their food and they excreted solutes that were relatively poorer in nitrogen than was their food.

Citation 467

TAFT, J. L. , A. J. ELLIOTT, W. R. TAYLOR

Chesapeake Bay Institute, The Johns Hopkins University, Baltimore, MD

Box Model Analysis of Chesapeake Bay Ammonium and Nitrate Fluxes

In: Estuarine Interactions, edited by Martin L. Wiley, Academic Press

1978,115-130.

English

A kinematic box model using salt as natural tracer is employed as an analytical tool to estimate longitudinal and vertical transport of ammonium and nitrate in Chesapeake Bay. Both conservative behavior and non-conservative nutrient addition and removal are quantitated for the two layers of each segment in this partially mixed estuary. Results suggest the lower layer is an ammonium source year round. North of 35o53'N new nitrogen input may be significant in supporting phytoplankton productivity during winter, but south of this latitude nitrogen regenerated in the upper mixed layer is more significant to primary production. The most active regions for longitudinal flux are near the Potomac River mouth and near 39o00'N.

Citation 468

TAFT, J. L. , MICHAEL E. LOFTUS, W. ROWLAND TAYLOR

Chesapeake Bay Institute, Johns Hopkins University, Baltimore, MD 21218

Phosphate Uptake from Phosphomonoesters by Phytoplankton in the Chesapeake Bay

Limnol Oceanogr

1977(Nov),22(6),1012-1021.

English

Phosphomonoester concentrations were 0 to 0.09 ug-atom liter-1 in Chesapeake Bay from December 1972 to December 1973. Alkaline phosphatase activity associated with natural phytoplankton assemblages indicated the cells' potential to utilize the monoesters as a phosphorus source. However, ecological interpretation of alkaline phosphatase activity data is complicated by the necessity to increase the monoester concentration in order to measure enzyme activity fluorometrically. The half-saturation constant (Ks) was 0.31 for 3-0-methyl fluorescein hydrolysis by a natural phytoplankton assemblage and 0.75 uM for glucose-6-PO4 by a nanoplankter in culture, and maximum velocities (Vm) were 3.2 and 6.4 nm (ug Chl a h)-1. In one experiment with a natural phytoplankton assemblage, organisms in the 0.8-5 um size range comprised 78%

of the plant biomass and were responsible for 70% of the phosphorus uptake from glucose-6-PO4 when size fractionation preceded experimental incubations. Phosphomonoesters may contribute to phytoplankton phosphorus nutrition during much of the year, but are in greatest demand in spring in Chesapeake Bay.

Citation 469

TAFT, J. L. , W. R. TAYLOR, J. J. MCCARTHY

Chesapeake Bay Institute, The Johns Hopkins University; Baltimore, MD

Uptake and Release of Phosphorus by Phytoplankton in the Chesapeake Bay Estuary, USA

Mar Biol

1975,33,21-32.

English

The phytoplankton uptake and release rates for inorganic phosphate, dissolved organic phosphate and polyphosphate were estimated during 5 cruises on the Chesapeake Bay over a 9-month period. Phosphorus in all pools turned over in several minutes to 100 h, and each soluble pool appeared to contain fractions which were metabolically useful to the phytoplankton. Maximal uptake rates (Vm) for orthophosphate ranged from 0.02 to 2.95 ug-at P (l. h)-1 with half saturation constants (Ks) between 0.09 and 1.72 ug-at P 1-1. At low soluble reactive phosphorus concentrations, the uptake rate of trace 32P orthophosphate was initially rapid, but declined after 15 to 60 min incubation. The data suggest that the initial uptake phase was dominated by exchange of 32PO4 for 31PO4 in the membrane transport systems whereas the subsequent phase represented the net incorporation of orthophosphate into phytoplankton cells.

Citation 470

TAGA, N. , H. KOBORI

Ocean Research Institute, University of Tokyo, Nakano, Tokyo, Japan

Phosphatase Activity in Eutrophic Tokyo Bay

Mar Biol

1978,49,223-229.

English

Alkaline phosphatase activity in seawater samples taken from Tokyo Bay was measured by both spectrophotometric and fluorometric methods. A stratified distribution pattern of the enzyme was observed in August, a vertically mixed pattern in December. The distribution of phosphatase activity in the eutrophic seawater was paralleled by variations in other parameters, such as viable counts of bacteria, chlorophyll a content, inorganic and total phosphorus concentrations, amounts of seston, particulate deoxyribonucleic acids (DNA) and protein. A significant correlation between phosphatase activity and these measurements indicated that the enzyme was a good indicator of the degree of eutrophication. The positive relationship between phosphatase and inorganic phosphorus indicates that enzyme activity was not inhibited at inorganic phosphorus levels present in the bay and that production of phosphatase by microorganisms inhabiting the bay was not repressed at the inorganic phosphorus levels in the bay. Culture experiments revealed that the formation of repressible phosphatase by bacteria isolated from the bay was not affected by the inorganic phosphorus levels in the bay.

Citation 471

TAMURA, YASUSHI

Agric. Dep. , Nagoya Univ. , Nagoya, Japan

Prevention of Eutrophication in an Estuary

Suiri Kagaku

1977,21(4),33-40.

Japan

A review, with 7 refs. , on prevention of eutrophication by oyster cultivation, salt removal from soil, nutrient removal from sewage, and a proposed plan for control by city sewer systems.

Citation 472

TASLAKIAN, M. J. , J. T. HARDY

American Univ. , Beirut, (Lebanon), Dept. of Biology

Sewage Nutrient Enrichment and Phytoplankton Ecology Along the Central Coast of Lebanon

Mar Biol

1976,38,315-325.

English

The abundance and taxonomic diversity of phytoplankton has been studied in relation to sewage pollution (proximity to outfalls) south of Beirut, Lebanon. Surface-water samples were collected from a series of beach stations extending from the American University of Beirut to 20 km south from June, 1973 to July, 1974. Water samples from the vicinity of two major sewer outfalls (Carlton and Khalde sewers) showed very high concentrations of NH_4^+, NO_2^-, NO_3^-, and PO_4^{-3}, a greater total concentration of phytoplankton, and a lower taxonomic diversity than samples remote from outfalls. A considerable variation in the occurrence of species and dominance occurred along the pollution gradient. Blue-green algae and dinoflagellates were dominant in polluted waters, while diatoms dominated in cleaner water away from major sewage outflow. From the dominance and relative distribution of the taxa along the pollution gradient, certain taxa (Oscillatoria spp. , Spirulina spp. , Phormidium spp. , Synochococcus custos and S. elongatus, Gymnodinium spp. , and Prorocentrum spp.) emerge as indicator species of pollution. These changes correspond to a typical degradation of a complex community to a less mature state by the inflow of nutrient-rich sewage (eutrophication) along a coastal region about 10 km long.

Citation 473

TAYLOR, W. R.

Johns Hopkins Univ. , Baltimore, MD

The Ecology of the Plankton of the Chesapeake Bay Estuary

NTIS

Sept 1972- June 1973, NTIS Progress Rep. COO 32796,54p.

English

The major nutrient constituents in the Chesapeake Bay Estuary were studied to establish a bay-wide baseline for chemical oceanography studies and to determine whether the major nutrients were at any time of the year possible limiting factors in primary productivity. Nitrate and nitrite analysis were made with a Technicon Autoanalyser II system. Ammonium ion concentrations were determined. The final color was measured on the autoanalyser using only the sampler pump, colorimeter with 630 nm filter and the recorder. Phosphorus analyses were run on the autoanalyser. Total dissolved carbon and inorganic carbon were determined with a Beckman model 915 carbon analyzer. Dissolved organic carbon was taken as the difference between these quantities. Chlorophyll a, chlorophyll b, chlorophyll c, and phaeophytin analyses were done by the fluorometric method. In order to obtain both organic and total components, the ultraviolet irradiation method of Armstrong et al. , was employed to oxidize aliquots of the samples. Preliminary results of nutrient analyses from Aesop cruises are tabulated. Recoveries as nitrite plus nitrate of nitrogen after µv irradiation are given. Computation of typical correction factors for northern Bay stations on Aesop 9 cruise is shown.

Citation 474

TAYSI, I. , N. VAN UDEN

Department of Microbiology, Botanical Institute, University of Lisbon, Lisbon, Portugal

Occurrence and Population Densities of Yeast Species in an Estuarine-Marine Area

Limnol Oceanogr

1964,9(1),42-45.

English

A survey of two temperature estuaries (Rivers Tagus and Sado, Portugal) and the adjacent Atlantic Ocean revealed that the numbers of yeast species decreased with increasing distance from the estuaries. The species common in both the estuaries and the adjacent ocean belonged to genera (Debaryomyces and Rhodotorula) that are widespread in the seas. The species exclusively or predominantly estuarine were Candida intermedia, C. lambica, C. silvicol, and Torulopsis candida. The maximum temperatures for growth of these species is about 10C lower than those of intestinal species (Candida albicans, C. krusei, C. tropicalis, and Torulopsis glabrata) previously found to occur in subtropical and tropical waters. The apparent role of water temperature as a selective factor for yeast growth is discussed.

Citation 475

TENNYSON, PAMELA S. , SUSAN O. BARRICK, FRANK W. WOJCIK, JOHN J. NORCROSS, WILLIAM J. HARGIS, JR.

Virginia Inst. of Marine Science, Gloucester Pt. , VA 23062

The Chesapeake Bay Bibliography, Vol. 2, Virginia Waters

VIMS

1972(June), Special Sci. Rep. No. 63.

English

This work is the promised continuation and enlargement of the Chesapeake Bay Bibliography. This, the second volume , is devoted largely to materials focused on the lower half of the Bay, though articles of bay-wide interest are included. Our primary purpose remains to develop a comprehensive research and information services program for those interested in management of and research on the environments and resources of the Bay region.

Citation 476

TEXAS WATER DEVELOPMENT BOARD, TEXAS DEPT. OF WATER RESOURCES,

Austin, TX

Techniques for Evaluating the Effects of Water Resources Development on Estuarine Environments

Texas Dept. of Water Resources

1978, Accession No. 6039,314p.

English

Citation 477

THOMANN, R. V. , D. J. O'CONNER , D. M. DI TORO

Manhattan Coll. , Bronx, N Y 10471 Environmental Engineering and Science Program

Modeling of the Nitrogen and Algal Cycles in Estuaries

Proceedings, 5th International Water Pollution Research Conference

1970(July-Aug), paper 111-9,14p.

English

Two mathematical models were constructed to address the problems of nitrogen and algal cycles. The steady-state, multi - dimensional model was used for analyzing nitrification and algal utilization of available nitrogen. The dynamic model incorporated the growth and death of phytoplankton and herbivorous zooplankton and the utilization of inorganic nitrogen. Application of the first model to the Delaware Estuary indicated the rate of ammonia oxidation of about 0.1/day at 20C with nitrification inhibition at DO less than 1-2 mg/l. A lower DO resulted from nitrogen oxidation. The same model applied to the Potomac Estuary indicated algal utilization of nitrates at 0.1/day at 20C. The dynamic non-linear model, applied to Sacramento-San Joaquin Delta, (Calif) adequately described the algal growth and utilization of nutrients. The net algal growth coefficient ranged up to 0.3/day during the spring.

Citation 478

THOMANN, ROBERT V. , DOMINIC M. DI TORO, DONALD J. O'CONNOR

Assoc. Prof. , Environmental Engrg. and Sci. Program, Manhattan Coll. , Bronx, NY

Preliminary Model of Potomac Estuary Phytoplankton

J Environ Eng Div Am Soc Civ Eng

1974(June),100(EE3),699-715.

English

The upper 40-mile reach of the Potomac Estuary is modeled by a nonlinear, time variable representation of phytoplankton dynamics. Nitrogen and phosphorous recycling is included. Sensitivity analyses indicate that phytoplankton from tidal embayments can contribute as much as 40 ug/l to observed chlorophyll in the main channel. Loss of phosphorous to the sediments is significant. Flow transport through the estuary and the nutrients and phytoplankton associated with increasing river flow are particularly important. Simulations indicate that under nondrought flows and a 90% reduction of untreated nutrient loads, chlorophyll concentrations in the main channel may rise to 50 ug/l and to 70 ug/l in tidal embayments. These concentrations are above an objective of 25 ug/l, but are about 60% less than pesent values.

Citation 479

THOMAS, W. H. , D. L. R. SEIBERT, A. N. DODSON

California Univ. , San Diego, La Jolla, CA, Inst. of Marine Resources

Phytoplankton Enrichment Experiments and Bioassays in Natural Coastal Sea Water and in Sewage Outfall Receiving Waters Off Southern California

Estuarine Coast Mar Sci

1974,2,191-206.

English

Nutrient enrichment experiments using diatoms and a dinoflagellate with near-shore Southern California surface water showed that nitrogen was the principal nutrient limiting phytoplankton growth. Secondary limitations were shown for phosphate, silicate, iron, trace metals (molybdenum, zinc, manganese, cobalt, copper) and vitamins (vitamin B12, biotin, thiamin). Addition of Point Loma sewage was stimulatory and a complete nutritive additive. Bioassays showed that receiving waters were sometimes stimulatory and at other times inhibitory to algal growth. In some cases there was little or no growth, even on enrichment; this inhibition varied with the test organism, season, and water sample tested. Red tides were probably not caused by sewage enrichment but by any process (advection or upwelling) which enriched surface sea waters. Water near outfalls was eutrophic with a balance between inhibition and stimulation of phytoplankton by sewage input. These studies used in vivo fluorescence to measure algal growth. A comparison of growth rates obtained by fluorescence with cell division rates showed that fluorescence was rapid, sensitive, could be used with all types of phytoplankton, and measured chlorophyll increase, but may vary with light intensity and cellular nutritional status.

Citation 480

TILLEY, L. J. , W. A. DAWSON

Geological Survey, Tacoma, WA

Plant Nutrients and the Estuary Mechanism in the Duwamish River Estuary, Seattle, Washington

Geological Survey Res

1971, Chapt. C, Paper 750-C, C185-191.

English

The Duwamish River estuary, Washington, traps plant nutrients in the water of its salt wedge. Analyses of input and output of nutrient concentrations in the estuary show a nearly twofold increase in concentrations of nutrients in the salt wedge. The increase consists of nutrients transferred from the outflowing river water in amounts which barely affect river-water concentrations.

Citation 481

TILLEY, L. J. , W. L. HAUSHILD

Geological Survey, Menlo Park, CA

Use of Productivity of Periphyton to Estimate Water Quality

J Water Pollut Control Fed

1975,47(8),2157-2171.

English

In a comprehensive study of the effects of changes in wastewater disposal practices on the Duwamish River (Wash.) Estuary, the amount and rate of change of chlorophyll a was used to determine the net primary productivity of the Periphyton growing upstream from the estuary in the Duwamish-Green River. The net primary productivity varied among three stream environments sampled in the study during the summer and fall of 1969. Net primary productivity averaged 3.6 mg/wk/sq m in a mountainous reach, increased to 6.2 in a lowland reach, and was as much as 17.5 in an estuarine reach. The productivity of Periphyton was related to concentration of selected nutrients (nitrate, nitrite, ammonia, and phosphate) in the stream. The small temperature changes along the stream probably had a minor influence on the differences in Periphyton growth rates.

Citation 482

TOMAS, CARMELO R.

Graduate School of Oceanography, Univ. of Rhode Island, Kingston, RI

Olisthodiscus luteus (Chrysophyceae). III. Uptake and Utilization of Nitrogen and Phosphorus

J Phycol

1979,15,5-12.

English

Uptake and assimilation of nitrogen and phosphorus were studied in Olisthodiscus luteus Carter. A diel periodicity in nitrate reductase activity was observed in log and stationary phase cultures; there was a 10-fold difference in magnitude between maximum and minimum rates, but other cellular features such as chlorophyll a, carbon, nitrogen, C/N ratio (atoms) cell-1 were less variable. Ks values (2 uM) for uptake of nitrate-N and ammonium-N were observed. Phosphorus assimilated cell-1 day-1 varied with declining external phosphorus concentrations; growth rates <0.5 divisions day-1 were common at <0.5 uM PO4P. Phosphate uptake rates (Ks = 1.0-1.98 uM) varied with culture age and showed multiphasic kinetic features. Alkaline phosphatase activity was not detected. Comparisons of the nutrient dynamics of O. luteus to other phytoplankton species and the ecological implications as related to the phytoplankton community of Narragansett Bay (Rhode Island) are discussed.

Citation 483

TRAAEN, T. S.

Norsk Institutt for Vanforskning, Blindern

Biological Effects of Primary, Secondary, and Tertiary Sewage Treatment in Lotic Analog Recipients

Verh Int Verein Limnol

1975,19,2064-2069.

English

Experiments conducted in an outdoor, twelve-channel system have shown that experimental channels used as recipient analogs are a sensitive tool for detecting biological community response to sewage effluent. Until the connection between chemical water parameters and biological response are better understood, recipient analog systems can be useful and effective for effluent monitoring.

Citation 484

TRIDENT ENGINEERING ASSOCIATES, INC.

Annapolis, MD

Chesapeake Bay Case Study

Trident Eng Ass Inc

1968(Sept),131p.

English

The policies of the Maryland, Virginia, and U. S. Governments on the use, development, and pollution control of the Chesapeake estuary, and the effects of present use and policies on water quality are surveyed. There is no State control of water development and pollution abatement, but both states leave control to individual counties, which have no integrated, uniform, or consistent policies. State and Federal matching funds and grants encourage long-range planning, but do not have provision for certification by state or regional planning agencies. Some Federal statutes, particularly urban renewal statutes, even encourage local, municipal, or neighborhood control. Coordination of local plans is needed, as well as the establishment at a regional planning agency, if the quality of the area is to be maintained. A combined Federal-State-local agency for planning, enforcement, construction, and regional regulation of development of Chesapeake Bay in water quality, marine life, erosion control, commerce, zoning, parks, recreation and fishing is recommended.

Citation 485

TROUP, B. N. , O. P. BRICKER, J. T. BRAY

Case Western Reserve Univ. , Cleveland, OH, Dept. of Geology

Oxidation Effect on the Analysis of Iron in the Interstitial Water of Recent Anoxic Sediments

Nature

1974(May),249,237-239.

English

The importance of oxidation in the studies on the concentration of trace constituents in the interstitial water of anoxic sediments in the Chesapeake Bay was evaluated. Nine cores were taken in rapid succession; a layer of each core, 67-72 cm below the sediment-water interface, was extruded, homogenized and loaded into two 2.5 cm squeezers. One of the pair of squeezers from each core was never exposed to the atmosphere and was manipulated under nitrogen. The second squeezer of each pair was removed from the nitrogen glove bag after loading and exposed to the atmosphere for 15 min with its top removed. An aliquot was taken simultaneously from each of the squeezers after 15 ml of interstitial water had been squeezed. It was concluded that discrete sampling and analysis of the aliquot directly from the squeezer, under a nitrogen atmosphere, is the best method of ensuring analytical accuracy, and the rapid change in Fe(II) concentration observed in the initial period of squeezing must result from the oxidation of ferrous ion to ferric hydroxide by the small amount of oxygen trapped in the squeezer during transfer of sediment from the core to the squeezer.

Citation 486

TUFFEY, T. J.

Rutgers-The State University, Brunswick, NJ

The Detection and Study of Nitrification in Streams and Estuaries

Rutgers-The State University

1973(Jan), PhD Dissertation

English

Citation 487

TUFFEY, T. J. , J. V. HUNTER, V. A. MATULEWICH

Rutgers - The State Univ. , New Brunswick, NJ, Water Resources Research Inst.

Zones of Nitrification

Water Resour Bull

1974(June),10(3),555-564.

English

The hypothesis is advanced that nitrification exists in shallow streams as a result of surface activity and in estuaries due to growth in the water phase. Between these zones no significant levels of nitrification occur. Field measurements of ammonia, nitrite and nitrate nitrogen, enumerations of Nitrosomonas and Nitrobacter, and respirometry on two small streams and two moderately large rivers are presented. The appropriate mathematical models to describe nitrification must be based on the mechanisms involved bacterial growth kinetics for estuaries and zero kinetics for the surface activity in shallow streams.

Citation 488

UDA, M. , T. NAKAO, A. KISHI

Marine Pollution in Suruga Bay and Associated Environmental Change in Relation to Fisheries

J Fac Mar Sci Technol, Tokai Univ

1977,10,147-174.

Japan

In order to study the actual state of marine pollution in Suruga Bay due to the effluents of pulp-mill sludge water and other complex industrial wastes together with domestic wastes, surveys were carried out during the years 1971-76 on and around the coasts of the bay. During the years 1971-76 the condition of the fisheries, which had been improving with the approach and intrusion of the Kuroshio branch current together with the strict control of industrial and domestic wastes. However, more comprehensive monitoring and management through recycling of waste resources and wise energy utilization is needed for complete protection from marine pollution in Suruga Bay in the future, even when the remote-flowing Kuroshio current shifts to a different phase.

Citation 489

UEMATSU, MITSUO, MASAO MINAGAWA, HIDEYUKI ARITA, SHIZUO TSUNOGAI

Laboratory of Analytical Chemistry, Faculty of Fisheries, Hokkaido University

Determination of Dry Weight of Total Suspended Matter in Seawater

Bull Fac Fish Hokkaido Univ

1978,29(2),164-172.

Japan

A practical method has been devised for the determination of suspended particulate matter in seawater. Improvements have been done chiefly in the washing solution and the choice of a filter paper. In a recommended procedure, a seawater sample is filtered through a membrane filter, Nucleopore filter of 0.4 um, within 12 hours after sampling. The filter paper is washed with 3.5% ammonium carbonate solution to remove sea salts after putting on another filter holder of a larger size. The washed filter is dried in a vacuum drying oven and weighed by using a semi-micro or micro balance. The detection limit was as low as 0.01 mg/l.

Citation 490

UNITED NATIONS EDUCATIONAL SCIENTIFIC AND CULTURAL ORG.

Paris, France

A Comprehensive Plan for the Global Investigation of Pollution in the Marine Environment and Baseline Study Guidelines

UNESCO, Intergov. Oceanogr Comm

1976, Technical Ser. No. 14,42p.

English

This report is an amalgamation of a document entitled 'A Comprehensive Plan for a Global Investigation of Pollution in the Marine Environment', and a document entitled 'Report of the IOC/ICES Working Group on Baseline Study Guidelines', as amended by the IOC Executive Council at its seventh session in Bergen, June 1976. The GIPME Comprehensive Plan provides an international framework within which national and regional programs on various aspects of marine pollution may be coordinated to contribute to an understanding of global pollution problems. The ultimate objective of a comprehensive investigation of marine pollution is to provide a sound scientific basis for the assessment and regulation of the pollution problem, including sensibly planned and implemented monitoring programs. Equal priority is given to a number of research activities dealing with inputs, pathways, sinks, effects and dose/response relationships. Baseline studies will provide valuable data on inputs, distributions and pathways, and to some degree will help the mass-balance studies.

Citation 491

UNITED NATIONS ENVIRONMENT PROGRAMME

Preliminary Report on the State of Pollution of the Mediterranean Sea

Intergovernmental Review Meeting of Mediterranean Coastal States on the Mediterranean Action Plan. Monaco, 9-14(Jan)1978

1978(Jan),208p.

English

The report is a general discussion of N, P, and organic matter as necessary growth substances for biological systems, and oxygen-oxidation processes. Eutrophication is the underlying theme. Specific case research and data is presented for the Mediterranean Sea system including nutrients, trace metals, chlorinated and petroleum hydrocarbons, radioactive materials, and microbiological contaminants.

Citation 492

UPCHURCH, J. B. , J. K. EDZWALD, C. R. O'MOLIA

North Carolina Univ. , Chapel Hill, NC, Dept. of Environmental Sciences and Engineering

Phosphates in Sediments of Pamlico Estuary

Environ Sci Technol

1974,8(1),56-58.

English

Amount of available phosphorus present in bottom sediments of North Carolina's Pamlico Estuary was plotted as a function of the distance downstream. The figure includes only those samples in which the percentage of clay and silt exceeded 85% and represents the changes from a freshwater to a saline environment. The term 'available phosphorus' refers to a fraction of the total phosphorus that is extracted using a procedure devised by Wentz and Lee. The amount of available phosphorus extracted from sediment samples was observed to decrease from 1.6 mg P/g sediment in fresh water to 0.3 mg P/g sediment in water with a salinity 18 ppt. The decrease in the available P and in the Fe-P correlation along the length of the estuary is consistent with the suggestion that P is held to suspended sediments by some type of Fe-inorganic P complex of limited stability. Suspended materials entering the estuary in the fresh water inflow could lose phosphorus to solution as they are transported through waters of increasing salinity to the mouth of the estuary.

Citation 493

UPCHURCH, JOSEPH B.

North Carolina Univ. , Chapel Hill, NC, Dept. of Environmental Sciences and Engineering, N C

Sedimentary Phosphorus in the Pamlico Estuary of North Carolina

Sea Grant Publication, N C

1972(May), UNC-SG-72-03,45p.

English

There has been increasing interest and research concerning the role of phosphorus in the eutrophication of natural aquatic systems. The study examines the amount of 'available' phosphorus present in the bottom sediments of the Pamlico Estuary in North Carolina during transition from a fresh water to an estuarine environment. The available phosphorus was measured by a modification of the HCl -H2SO4 (pH 1.1) acid extraction procedure. A correlation between oxalate-extractable iron and available phosphorus was found. The decrease in the available P and in the Fe-P correlation along the length of the estuary are consistent with the suggestion that P is held to suspended sediments by some type of Fe-inorganic P complex of limited stability. Sediments entering the estuary in the freshwater inflow would lose phosphorus as they are transported through waters of increasing salinity.

Citation 494

US ENVIRONMENTAL PROTECTION AGENCY

Estuarine Pollution Control and Assessment, Proceedings of a Conference held at Pensacola, FL, 11-13(Feb)19751975

US EPA

1977(Mar),440/1-77-007A.

English

Citation 495

US ENVIRONMENTAL PROTECTION AGENCY

Annapolis Field Office, Annapolis, MD

Survey Results of the Chesapeake Bay Input Study 1969-1970

US EPA

1970, Data Rep. No. 31 , 26p.

English

The purpose of this study was to determine the nutrient loadings into the Chesapeake Bay from the six major drainage areas: Susquehanna, Potomac, Rappahannock, York, James, Patuxent. Samples were analysed for nutrients, DO, BOD, carbon, and chlorophyll a. Complete survey results are tabled according to station, date and time of sample. No textual results or conclusions are given. No references. Abstr. by JMB.

Citation 496

US ENVIRONMENTAL PROTECTION AGENCY

Pacific Northwest Environmental Research Lab. , Corvallis, OR

Marine Algal Assay Procedure: Bottle Test

U S EPA

1974 (Dec), EPA/660/3-75-008,51p.

English

The report describes protocol for a standardized primary producer nutrient bioassay for assessment of the effect of cultural eutrophication in estuarine and coastal marine areas. It is a companion procedure to the freshwater Algal Assay Procedure: Bottle Test, EPA, August, 1971. The green biflagellate unicellular alga Dunaliella tertiolecta Butcher (DUN clone) was selected as the bioassay organism because of its wide salinity tolerance, sensitivity to incremental additions and natural levels of critical or limiting nutrients, excellent replication and simple evaluation characteristics. The report contains numerous references.

Citation 497

US ENVIRONMENTAL PROTECTION AGENCY

Pacific Northwest Environmental Research Lab, Corvallis, OR

Proceedings: Biostimulation and Nutrient Assessment Workshop

US EPA

1975(June), Ecol. Res. Ser. Rep. No. EPA-660/3-75-034,325p.

English

Contributions to this workshop discuss algal assay procedures and their applications in determining the trophic level of lakes and rivers, as well as algal inhibitors. Research results presented apply to determination of adenosine triphosphate in soils, the mass transport effect on algal growth stimulation, and zinc toxicity to the green alga Selenastrum capricornutum as a function of phosphorus or ionic strength. The methodology employed by the national eutrophication survey in algal assays is described followed by discussions of frequency analysis of cyclic phenomena in flowing streams, the effect of higher trophic level components in an aquatic ecosystem model, the determination of effects of waste discharge in the Spokane River system (Wash.) by algal assays, the effects of nitrogen and phosphorus on the growth of Selenastrum capricornutum, and the use of in situ algal assays to evaluate the effects of sewage effluents on the Shagawa Lake (Minn.) phytoplankton. Presented also is the development of a standardized marine algal assay for nutrient assessment in saline waters, the growth requirements of the marine Entermorpha compressa and Codium fragile, Great Lakes nutrient assessment, and waste treatment efficiency assessment by the algal assay test. Two concluding papers discuss the utilization of energy by primary producers in

Florida ponds, and the heteroinhibition as a factor in Anabaena flos-aquae bloom production.

Citation 498

US ENVIRONMENTAL PROTECTION AGENCY

Office of Water Planning and Standards, Washington, DC

Estuarine Pollution and Assessment, Proceedings of a Conference, Volumes I andII

US EPA

1977(Mar), EPA 400/1-77-007 A, Vol. 1 381p. , Vol. 2 755p.

English

This report is designed to provide information that could be used to establish a national program for the prevention, reduction, and elimination of pollution in estuaries. The Environmental Protection Agency has attempted to identify important estuarine problems by soliciting state-of-the - knowledge reports from leading scientists working in the field. The symposium was divided into the following sessions: A. Estuarine Systems B. Living and Non-Living Resources C. Fisheries D. Dredging Effects E. Nutrients F. Industrial Effects G. Power Plant Effects are contained in Vol. 1 ; H. Other Pollutants I. Research Applications J. Ports K. The Public's Role L. Legal Aspects M. Estuarine Economics are contained in Vol. 2. Each section is composed of several reports on the subject, accompanied by author, abstract and references.

Citation 499

UYENO, FUKUZO

Dalhousie Univ. , Halifax, Nova Scotia, Inst. of Oceanography

Nutrient and Energy Cycles in an Estuarine Oyster Area

J Fish Res Board Can

1966,23(11),1635-1652.

English

The nutrient circulation and microbial abundance of oyster-producing waters in the Malpeque Bay area, Prince Edward Island, were followed at 2 stations through an open season, and the efficiency of carbon assimilation and dissimilation was estimated. Part of the organic fall-out evidently entered the water again in the spring as nutrient salts, but a certian portion was not returned and this represented a net loss from the ecosystem. The nutrient circulation at a station located in a salt-water pond was more efficient than at a station located in a river estuary. At Levi Creek (Station A), high phosphate-P concentrations in September 1962 (2.10 microgram-atoms per liter) and in November (1.42 microgram-atoms per liter) might be derived from commercial fertilizer applied to cultivated fields. Occasional high values of nitrate-N were possibly due to particulate seston, and high mean values (about 4.8 microgram-atoms per liter) from July to the end of the season were attributed to rains. In the pond mineralization was 31% of primary production, largely by mud bacteria; in the estuary (Station C) it was 17%, due about equally to mud and water organisms.

Citation 500

VACCARO, RALPH F.

Woods Hole Oceanographic Institution, Woods Hole, MA 02543

The Response of Natural Microbial Populations in Seawater to Organic Enrichment

Limnol Oceanogr

1969,14(5),726-735.

English

When the heterotrophic potential technique is applied to marine situations, its analytical value is frequently impaired. In the open ocean, uptake responses often fail to develop despite use of a variety of 14C labeled substrates. Elsewhere, the incidence of uninterpretable kinetic uptake patterns is excessively high. However, when the period of exposure to organic enrichment is extended to 24 hr or more, natural populations from coastal areas develop measurable and analytically useful uptake patterns. Besides providing an attractive source of test cells for bioassay purposes, this shift in uptake behavior can be exploited for studying the dynamics of heterotrophic behavior. An assessment of the marine environment in terms of these and related observations is provided.

Citation 501

VACELOET, E.

Centre d'Oceanographie, Marseille (France), Station Marine d'Endoume

Role of Vitamins in Bacterial-Plankton Relationships in Littoral Seawater and in Supralittoral Pools: II. Annual Evolution of Organisms which Produce Vitamin Synthesis

Cah Biol Mar

1975,16,383-394.

English

Occurrence of vitamin-synthesizing organisms bacteria, fungi and yeasts in supralittoral rockpools and inshore waters was investigated. The seasonal changes of bacteria releasing vitamins are highly related to the heterotrophic microflora as a whole and especially to variations in the activity index of bacteria (ie, to the growth rate of bacterial population). The annual changes of fungi and yeasts are, in part, opposite of those of the bacteria, but bacteria, fungi and yeasts seem to be enhanced by high temperatures and strong concentrations of organic matter.

Citation 502

VANDERBORGHT, J-P. , R. WOLLAST, G. BILLEN

Brussels Univ. (Belgium), Lab d'Environment

Kinetic Models of Diagenesis in Disturbed Sediments. Part 2. Nitrogen Diagenesis

Limnol Oceanogr

1977(Sept),22(5),794-803.

English

A two-layer mass transfer model developed to describe the vertical silica profile in the sediments of a muddy zone of the North Sea along the Belgian coast was applied to the description of the microbiological processes involved in nitrogen diagenesis in the same sediments. Intense aerobic heterotrophic activity and nitrification were postulated in the upper layer. Denitrification and sulfate reduction were assumed to be preponderant in the lower layer. Vertical profiles of oxygen, sulfate, nitrate, and ammonium were calculated according to the model and adjusted to experimental profiles. The fluxes of nitrate and ammonium across the water-sediment interface and the rates of ammonification, nitrification, and denitrification in the 2 layers were calculated from the results of the models. As in the case of silica, the contribution of the upper layer is much more important than that of the underlying sediment.

Citation 503

VANDERBORGHT, J-P. , R. WOLLAST, G. BILLEN

Brussels Univ. (Belgium), Lab. d'Environnnement

Kinetic Models of Diagenesis in Disturbed Sediments. Part 1. Mass Transfer Properties and Silica Diagenesis

Limnol Oceanogr

1977,22(5),787-793.

English

The results of chemical analysis of the interstitial water of several samples of sediments from a large muddy zone along the Belgian North Sea coast were reported. When special care is taken to collect the cores without disturbing the water-sediment interface, the vertical concentration profiles display typical patterns that cannot be explained by constant diffusivity models and that suggest the existence of 2 distinct sedimentary layers with different mass transfer properties. A two-layer model was proposed to describe the vertical silica profiles. It assumes that the mass transfer coefficient in the first 3.5 cm of the sediment upper layer is 100 times higher than in the compacted lower layer. The large increase is due mainly to turbulent processes induced by the movement of the overlying water. From the model, the flux of dissolved silica across the water-sediment interface was calculated. The contribution of the upper layer represents 70% of the total flux of silica out of the sediments. As a consequence, the fluxes may be underestimated by a factor of 4 if the layer is discarded during sampling or handling of cores.

Citation 504

VANDERBORGHT, JEAN-PIERRE, GILLES BILLEN

Institut de Chimie Industrielle (Environment), Universite de Bruxelles, Laboratorium voor Ekologie en Systematick, Universiteit te Brussel, Brussels, Belgium

Vertical Distribution of Nitrate Concentration in Interstitial Water of Marine Sediments with Nitrification and Denitrification

Limnol Oceanogr

1975(Nov),20(6),953-961.

English

Vertical concentration profiles of nitrate and nitrite in interstitial water of sediment in the Sluice Dock at Ostend (Belgium) commonly show a maximum in nitrate concentration at a few centimeters depth where sediments are sandy and poor in organic matter, while in muddy and organic-rich sediments, nitrate is lower in interstitial water than in the overlying water and decreases rapidly with depth. Direct measurements of the activity of autotrophic nitrifying bacteria in the sediments show nitrification in the upper few centimeters of sandy sediments but not in muddy sediments. A mathematical model is proposed to analyze quantitatively these experimental results, taking into account nitrification, denitrification, diffusion, and sedimentation. Seasonal variations of nitrate concentration in overlying water are slow enough to justify the use of a stationary (steady state) model. When appropriate values are used for the parameters (rate of nitrification, depth of the sedimentary layer in which nitrification occurs, rate of denitrification, diffusion coefficient), some being experimentally determined, the model predicts concentration profiles in good agreement with experimental data.

Citation 505

VAUGHN, J. M.

New Hampshire Univ. , Durham

The Use of Coliphage as an Index of Human Enterovirus Pollution in an Estuarine Environment

New Hampshire Univ.

1972, PhD Dissertation, 68p.

English

Parallel examinations of sewage effluents, shellfish and shellfish growing waters for coliphage and enteric virus indicated a wide dissemination of coliphage throughout the estuary, generally occurring in the absence of detectable enteric virus activity. A majority of the enteric virus isolations were observed in samples yielding no coliphage activity. Under controlled conditions, oysters were observed to accumulate more coliphage than enteric virus. Replication of coliphage in the estuary during the summer months was shown to occur when proper host cell was present. Two major coliphage types were observed in field samples based on their reactivity with different Escherichia coli strains. Survival times of coliphage and enteric virus in estuarine waters along with retention values in oysters were shown to be similar with a slight advantage shown by coliphage. Inability to correlate accurately coliphage and enteric virus occurrence in field samples along with the potential for the presence of more than one dominant coliphage type indicated the serious shortcomings of the coliphage indicator system as a method of enteric virus detection. A secondary characterization study was performed on one of the two dominant bacteriophage types occurring in field samples. Nutritional studies revealed an absolute requirement for copper ions.

Citation 506

VENUGOPALAN, V. K. , A. RAJENDRAN

Centre of Advanced Study in Marine Biology, Porto-Novo-608 502, S. India

Dissolved and Particulate Nitrogen in Vellar Estuary

Bull Dep Mar Sci Univ Cochin

1975,7(4),885-897.

English

Data were collected from water samples taken over a two-year period (1970-72) at stations in the Vellar estuary. The distribution, seasonal variation, and interaction between the dissolved and particulate fractions of both inorganic and organic nitrogen compounds are described. Factors controlling the distribution of nitrogenous nutrients and the importance of dissolved organic nitrogen in the nutrition of phytoplankton are discussed.

Citation 507

VERNBERG, F. J. , R. BONNELL, B. COULL, R. DAME, JR. , P. DECOURSEY, W. KITCHENS, JR. , B. KJERFVE, H. STEVENSON, W. VERNBERG, R. ZINGMARK

Belle W. Baruch Institute for Marine Biology and Coastal Research, University of South Carolina, Columbia, SC 29208

The Dynamics of an Estuary as a Natural Ecosystem

US Environmental Protection Laboratory, Office of Research and Development, Gulf Breeze, FL 32561

1977(Jan), EPA-600/3-77-016.

English

A research program was initiated to understand the dynamics of a relatively undisturbed estuary-marshland ecosystem, the North Inlet Estuary near Georgetown, South Carolina. Because of the relative complexity of this type of study, a five year study was proposed; this report summarizes results of the first two years. This study consisted of two substudies: a macroecosystem substudy and a microecosystem substudy. The objectives of the macroecosystem study were: 1) to establish baseline data on an undisturbed estuary to provide a scientific basis for comparative studies on effects of various stresses of pollutants on other estuarine environments; and 2) to develop models of an estuarine ecosystem which would predict probable effects of environmental perturbation. The principal objective of the microecosystem study was to develop and test replicate experimental salt marsh units at the microecosystem level as diagnostic tools for the assessment of both long- and short-term pollution effects on the Spartina alterniflora salt marsh community. A conceptual model of energy flow for the entire marsh-estuarine ecosystem was developed which consisted of three sub-models. A simulation of the water column submodel and a simulation by a linear systems model of an intertidal oyster community was completed. Much baseline data needed for model development is macrofauna, decomposers, and relevant physical parameters.

Citation 508

VIRGINIA POLYTECHNIC INST. AND STATE UNIV.

Blacksburg, VA, Water Resources Research Center

Annual Report for Fiscal Year 1971

WRRC Virginia(Blacksburg)

1971(Sept), VPI-WRRC-Bull-46,133p.

English

The report gives summaries of annual allotment programs which include Economic Disposal of Waste Sludges from Water Treatment Plants, A Pre-Impoundment Ecological Study of the Benthic Fauna and Water Quality in the North Ana River, Electrochemical Activation and Regeneration of Carbon Surfaces for Tertiary Water Treatment, Improving Water Quality by Removal of Pesticide Pollutants with Aquatic Plants, Seismic Investigation of Ground Water Reservoirs in the Virginia Coastal Plain Sediments, Optimal Conditioning Procedures for Waste Activated Sludge Disposal, Biology and Chemistry of Surface Freshwater Microlayers, and Techniques for Measuring Public Evaluation of Recreational and Hydroelectric Water Use. (Author)

Citation 509

VISHNIAC, H. S. , G. A. RILEY

Yale University, New Haven, CT

Cobalamin and Thiamine in Long Island Sound: Patterns of Distribution and Ecological Significance

Limnol Oceanogr

1961,6(1),36-41.

English

Cobalamin occurs in surface waters of Long Island Sound at high levels (to 16 uug/ml) during the winter, falling markedly with the late winter diatom bloom and rising during the summer with temperature. The pattern of cobalamin and PO4-P concentrations are similar, both nutrients reflecting but not limiting phytoplankton growth. Thiamine is present only in barely detectable amounts in the main body of the Sound. Data suggest that thiamine, but not cobalamin, may be mainly derived from land drainage.

Citation 510

WAGNER, D. D.

US Naval Acad. , Annapolis, MD 21402

An Investigation of the Physical Impact of Sewage Outflow on a River Estuarine Environment

US Naval Academy, Trident Scholar Project Report

1973(May), USNA-TSPR-50,72p.

English

The impact of the sewage outflow from the Annapolis (Maryland) treatment plant into the Severn River is explored. A buoyant plume model of the behavior of the sewage upon introduction to the receiving water is presented, indicating dilution to a 3% sewage concentration by the time the waste reaches the surface. Bottom currents are investigated and compared with surface flows to assess their affect on dispersion of the contaminants. Finally, a tidal flushing model is constructed that predicts a uniform sewage pollution excess over the conditions of the Chesapeake Bay of approximately 0.05% throughout the Severn River. The effects of various environmental changes on the system are discussed as predicted by modification of the numerical model. Under present circumstances, no detrimental physical impact on the environment can be shown to exist.

Citation 511

WAITE, THOMAS D. , RALPH MITCHELL

Sch. Eng. Environ. Des. , Univ. Miami, Coral Gables, FL

Role of Benthic Plants in Fertilized Estuary

J Sanit Eng Div Am Soc Civ Eng

1972,98 (SA5),763-70

English

Benthic plants in the littoral zone of an estuary fixed C at about 40 times the rate of phytoplankton. The total productivity of an estuary or coastal area depended on the size of the littoral zone. In deep waters or highly turbid estuarial waters light penetration was not sufficient for large macrophyte growth. Therefore the phytoplankton represented the largest component of plant production in the system. However, because of their high rate of productivity, the benthic plants contributed significantly to the rate of organic mater synthesis in areas where bottom flora was present. Benthic macrophytes were also better indicators of aquatic nutrient enrichment, esp. when tidal movement was sufficient to mix the phytoplankton out of the fertilized area. It was proposed that the Baule-Mitschlerlich relation may be used to predict the contribution to the photosynthetic yield of the bottom flora as a function of nutrient enrichment. While the Baule equation was simple and would not account for certain plant functions, it allowed for interaction of nutrients on plant growth, and suggested that the concept of a single limiting nutrient might not be applicable in the natural environment and should not be used as a criterion in water quality control decisions.

Citation 512

WALDICHUK, M.

Fisheries Research Board of Canada, Nanaimo (British Columbia), Biological Station

Eutrophication Studies of a Shallow Inlet on Vancouver Island

J Water Pollut Control Fed

1969,41(5) part I, 745-764.

English

While nutrient input into Portage Inlet (British Columbia) is not large, volume of the system is small and flushing mechanism so poor that nutrients tend to concentrate. Phosphates and nitrates are absorbed by plankton and deposited. Provincial government plans for a canal from Thetis Cove to Portage Inlet with locks for flushing the system rapidly appears a solution. Ecology will be modified and summer temperature in Portage Inlet will be reduced, making it less suitable for bathing--a small price for cleaner water to be regularly replaced by tidal action and for navigation improvement. Dredging might restore the inlet system removing much of the nutrients fixed in the sediments and rooted vegetation, but can be only a palliative if nutrients sources from the drainage system are not eliminated. Effect on ecology is unknown. It is conceivable that removal of rooted aquatics would lead to greater availability of nutrients to plankton resulting in undesirable concentrations of 'red tide' type organisms.

Citation 513

WALDICHUK, M.

Fisheries and Marine Service, West Vancouver (British Columbia), Pacific Environment Inst.

Coastal Marine Pollution and Fish

Ocean Manage

1974,2,1-60.

English

An effort is made to explore the various effects of man, particularly in his disposal of waste into the marine environment, on various fish stocks the world over. Because fish are dependent on lower forms in the food chain for nourishment, and because many of these lower forms constitute a seafood resource for man, they are considered along with the fin-fish as sea life affected by pollutants. Since most pollution originates from continents, the discussion deals mainly with coastal pollution. It is the coastal zone that the critical problems of the marine environment exist. Moreover, it is estimated that over 90% of the world's fish catch comes from 10% of the world oceans, i. e. , the continental shelf and upwelling regions where pollution may be most severe. The remaining 90% of the oceans is a biological desert. Emphasis is placed on fish species along the coast of North America. While there is clear-cut evidence of the harmful effect of pollution on fish stocks in some areas, where some of these fish have been destroyed by acute poisoning or by unfavorable conditions created in the aquatic environment, there are too many cause-effect relationships which must still be speculated upon.

Citation 514

WANG, LAWRENCE K. , M. H. WANG, C. P. C. POON, JON BERGENTHAL

Associate Professor, Dept. of Mechanical Engineering, Stevens Institute of Technology, Hoboken, N J

Chemistry of Nitrification-Denitrification Process

J Environ Sci

1978,21(6),23-28.

English

The significance of nitrification and denitrification phenomena in activated sludge process and receiving water is described. Special emphasis is placed on the description of nitrification - denitrification reaction, chemistry and respiration using general stoichiometric equations. Important design criteria of the nitrification-denitrification process that appear to be reasonable at this time are also reviewed.

Citation 515

WATER RESOURCES ENGINEERS, INC.

Walnut Creek, CA

Ecologic Modeling of Puget Sound and Adjacent Waters

Water Resources Engineers, Inc. , Walnut Creek, CA

1975 (Sep), WRE-11930-1,127p.

English

The project was an extension of a previous project entitled, 'Ecologic Simulation of Aquatic Environments', where a basic ecologic model was conceived (See W73-07164). Conceptually, the ecologic model was designed to simulate the ecologic succession from primary producers--algae--through successively higher trophic levels in the aquatic environment- - zooplankton, benthic animals and fish--under certain environmental stimuli. The driving inputs to this model are the primary nutrients, carbon, nitrogen (in several forms), and phosphorus, and light energy. In the study the model was modified to simulate ecologic successions, three-dimensionally in vertically stratified fjord-like estuaries. The model was applied to Puget Sound and an initial calibration was performed.

Citation 516

WATER RESOURCES RESEARCH INST.

Oregon State University, OR

The Quality of Oregon's Water Resources

WRRI Oregon

1971 (Aug), WRRI-9,25p.

English

The report describes the current pollution sources in Oregon and considers the effect of this pollution on receiving waters. It discusses the principal abatement methods being used, and reviews the progress being made in abatement programs in Oregon. The final pages briefly outline those problems which are expected to be most troublesome in the future. (Author)

Citation 517

WATER RESOURCES RESEARCH INST.

Raleigh, NC

Annual Report, 1 Jul 1969-30 Jun 1970

WRRI North Carolina

1971, UNC-WRRI-71-00,33p.

English

The Institute's research program for fiscal year 1969-70 was supported by the annual allotment and seven matching grants from the Office of Water Resources Research, U. S. Department of the Interior, non-federal matching and other funds from the State of North Carolina and private industry, and one grant from the Z. Smith Reynolds Foundation. The report contains description of water resource problems and related research projects, summary of research findings, and discussion of program development, education, and public service programs. (Author)

Citation 518

WEBB, KENNETH L, C. L. D'ELIA

Virginia Institute of Marine Science, Gloucester Pt. , VA 23062

Nutrient and Oxygen Redistribution by Estuarine Spring-Neap Tidal Cycles in the York River, Virginia submitted to Science, (Apr)1979.

English

Spring tidal currents produce a homogeneous water column in an estuary which is moderately stratified during neap tides. This mixing redistributes bottom produced ammonia and phosphate as well as surface produced oxygen and has profound implications for nutrient cycles, animal distributions in bottom water and for management of estuaries.

Citation 519

WELCH, EUGENE

Geological Survey, Washington, DC

Factors Initiating Phytoplankton Blooms and Resulting Effects on Dissolved Oxygen in Duwamish River Estuary, Seattle, Washington

Geol Surv Water - Supply

1969, Pap 1873-A, 62p.

English

Phytoplankton productivity, standing stock, and related environmental factors were studied during 1964-66 in the Duwamish River estuary, at Seattle, Wash. , to ascertain the factors that affect phytoplankton growth in the estuary. Phytoplankton blooms, primarily of diatoms, occurred in the lower estuary during August 1965 and 1966. No bloom occurred during 1964, but the presence of oxygen-supersaturated surface water in August 1963 indicates that a bloom did occur then. Nutrients probably were not the primary factor controlling the timing of phytoplankton blooms. The consistent coincidence of blooms with minimum fresh-water discharge and tidal exchange during August throughout the study period indicates that bloom timing probably was controlled mostly by hydrographic factors that determine retention time and stability of the surface-water layer. This control was demonstrated in part by a highly significant correlation of gross productivity with retention time (as indicated by fresh- water dishcarge) and vertical stability (as indicated by the difference between mean surface and mean bottom temperatures). The highly significant correlation of chlorophyll (a) with BOD throughout the summer indicates that respiration and decomposition of phytoplankton cells is clearly an important contributor of BOD. A green algal population in vitro did increase in response to added effluents nutrients; however, the available field data suggest that a 46% increase in effluent discharge between 1965 and 1966 did not increase the estuary's phytoplankton biomass significantly.

Citation 520

WELCH, EUGENE B.

Geological Survey, Tacoma, WA

Phytoplankton and Related Water-Quality Conditions in an Enriched Estuary

J Water Pollut Control Fed

1968,40(10),1711-1727.

English

Ammonia, soluble phosphate, and total phosphate concentrations were observed to increase in the Duwamish estuary, Washington, following initial discharge of effluent from the Renton Treatment Plant at Seattle. A phytoplankton bloom dominated by marine species occurred in the lower estuary in August 1965, about 1.5 months following the nutrient increase. A bloom did not occur in 1964, prior to effluent discharge from the treatment plant, but some evidence shows that algal activity was great in August 1963. The nutrient increase in 1965 probably was not the sole factor causing the bloom during that summer because: (a) the pre-effluent nutrient concentrations in 1963 and 1964 were relatively high, (b) a bloom also occurred at the furthest downstream station where no increase in nutrients was apparent in 1965 over that of the preceding two years; (c) a bloom probably occurred in 1963, before the addition of nutrients from the plant; and (d) the bloom maximum did not occur in 1965 until about 1.5 months after the nutrient increase, when discharge and tidal exchange conditions were minimum. Bloom timing seemed related most closely to hydrographic conditions.

Citation 521

WELCH, EUGENE B. , RICHARD M. EMERY, ROBERT I. MATSUDA, WILLIAM A. DAWSON

Department of Civil Engineering, University of Washington, Seattle, WA, 98195

The Relation of Periphytic and Planktonic Algal Growth in an Estuary to Hydrographic Factors

Limnol Oceanogr

1972,17(5),731-737.

English

The seasonal periodicity of periphyton growth in the Duwamish estuary (Washington) is compared with that of phytoplankton and lends support to a previous conclusion that hydrographic conditions determine the timing of phytoplankton blooms despite high concentrations of dissolved nitrogen and phosphorus. Accumulation of periphyton on substrates increased in June and July to around 10 ug Chl a cm-2 week-1 and is related to incident light; conversely, phytoplankton blooms were delayed until August and September when hydrographic conditions were optimum for biomass accumulations of from 30-70 ug Chl a/liter. Maximum growth of periphytic and planktonic algae occurred at the same location in the estuary. This similarity in spatial distribution is not directly related to hydrographic conditions since the periphyton algae are sessile and more resistant to washout. The water in this section of the estuary presumably contained a more adequate supply of one or more limiting nutrients than water from adjacent locations.

Citation 522

WHEELER, WILLIAM NEILSON

University of California, Santa Barbara, CA

Ecophysiological Studies on the Giant Kelp, Macrocystis

Univ. of California

1978, PhD Dissertation Order No. 7819144,193p.

English

The fronds and blades of the Macrocystis plant not only fix carbon but must take up the inorganic carbon and macronutrients from the surrounding sea. The uptake process involves mass transport through the boundary layer to the thallus surface and also assimilation via enzymatic reactions. It has been shown in this study that the photosynthetic output of a blade can increase by a factor of 300% when water speed over its surface is increased from 0 to 4 cm s-1. This indicates that the boundary layer next to the blade can limit the uptake of carbon. The availability of macronutrients, and nitrogen in particular, influences the growth of Macrocystis plants. The uptake of nitrate, but not ammonium or phosphate is influenced by irradiance. All three uptake processes are affected by water speed, much in the same way as is inorganic carbon. The uptake of nitrate and ammonium appears to be controlled by Michaelis-Menten like processes; Vm for nitrate being 75 while ammonium's is 275 nmoles cm-2h-1, Km's are 13 and 90 uM respectively. The growth rates of Macrocystis plants were measured in the sea during the spring (May) and the late summer (Aug. -Sept.). These rates vary between a negative 6% due to frond loss to 4% per day with no difference between the growth rates of spring and summer. A carbon budget is calculated by using measured photosynthetic capacities and respiration rates. From these calculations, a 6% daily growth rate based on weight is predicted for whole plants with about 15 stipes over 1 m in length. This is comparable with values cited in the literature of about 3% per day. A nitrogen budget for Macrocystis can also be calculated based on data from this study and from the literature. An hypothesis is developed to explain the storage effect found in Laminaria and other brown algae, lack of light effects on ammonium uptake, and the simultaneous uptake of nitrate and ammonium. (abbrev.)

Citation 523

WHIPPLE, WILLIAM, JR. , JOSEPH V. HUNTER, ROBERT C. AHLERT, SHAW L. YU

Rutgers - The State Univ. , New Brunswick, NJ

Estimating Runoff Pollution from Large Urban Areas - The Delaware Estuary

Water Resources Research Inst

1978(Jul), Rep. No. W78-12111,80p.

English

Research has been conducted on methods of estimating nonpoint source pollution from large areas, illustrated by the Delaware Estuary. Analyses of the BOD reaction indicate no serious inadequacies, in this case, of the usual approaches based on first order decay estimated from BOD rate determinations. Existing modeling methodologies were analyzed, and suggestions made for improved approaches. Subsequent quantitative analysis was made on the basis of storm event loading determinations, related statistically to storm characteristics and to land use. Considerable data obtained in the Trenton and Philadelphia areas are compared to experience of other investigators and extended to the urban areas adjacent to the Delaware Estuary.

Citation 524

WHITE, A. W.

Fisheries and Marine Service, St. Andrews (New Brunswick), Biological Station

Dinoflagellate Toxins and Probable Cause of an Atlantic Herring (Clupea harengus harengus) Kill, and Pteropods as Apparent Vector

J Fish Res Board Can

1977,34,2421-2424.

English

Stomachs of Atlantic herring (Clupea harengus harengus) from a kill that occurred in the Bay of Fundy during a bloom of the toxic dinoflagellate Gonyaulax excavata contained pteropods, algal remains, and paralytic toxins. Experiments show that comparable amounts of G. excavata toxins can kill herring rapidly. It is likely that the kill was caused by paralytic dinoflagellate toxins, and that the pteropod Limacina retroversa, a planktonic herbivore, acted as a vector of the toxins.

Citation 525

WHITE, D. C. , J. S. HERRON, J. D. KING

Florida State Univ. , Dept. of Biological Science, Tallahassee, FL 32306

Recovery of Poly-B-Hydroxybutyrate from Estuarine Microflora

Appl Environ Microbiol

1978(Feb),35(2),251-257.

English

Poly-B-hydroxybutyrate (PHB) is a uniquely procaryotic endogenous storage polymer whose metabolism reflects environmental perturbations in laboratory monocultures. When hydrolyzed for 45 min in 5% sodium hypochlorite, PHB can be isolated from estuarine detrital microflora in high yield and purified free from non-PHB microbial components. Lyophilization of frozen estuarine samples shortens the exposure time to NaOCl necessary for maximal recovery. Lyophilized samples of hardwood leaves, Vallisneria, and the aerobic upper millimeter of estuarine muds yielded PHB. The efficiency of incorporation of sodium (1- 14C)acetate into PHB is very high and is stimulated by aeration. PHB was not recovered from the anaerobic portions of sediments unless they were aerated for a short time. Levels of PHB in the detrital microbial community do not correlate with the microbial biomass as measured by the extractible lipid phosphate. PHB- like eucaryotic endogenous storage materials may more accurately reflect the metabolic status of the population than its biomass.

Citation 526

WHITFIELD, M.

CSIRO Division of Fisheries and Oceanography, Cronulla, NSW 2230, Australia

Eh as an Operational Parameter in Estuarine Studies

Limnol Oceanogr

1969,14(4),547-558.

English

Quantitative interpretation of Eh measurements in natural aqueous systems is difficult because of problems associated with the technique of measurement, the performance of the inert metal electrode, and the thermodynamic behavior of the environment. However, the parameter is useful as a semiquantitative indicator of the degree of stagnation of a particular environment. A compound probe is described that reduces the technical problems and enables pH, Eh, and pS2- measurements to be made simultaneously on a single sample. With this probe, Eh can be used as an operational parameter to map the distribution of estuarine sediments.

Citation 527

WHITLOCK, C. H. , III

Old Dominion Univ. , Norfolk, VA, Dept. of Civil Engineering

Fundamental Analysis of the Linear Multiple Regression Technique for Quantification of Water Quality Parameters from Remote

Sensing Data

Old Dominion Univ.

1977(May), PhD Dissertation, 176p.

English

Inconsistent results have been obtained from previous experiments which have applied linear multiple regression techniques to remote sensing data for quantification of water quality parameters. The study objective is to define optical physics and/or environmental conditions under which the linear multiple regression should be applicable. An investigation of the signal response equations is conducted and the concept is tested by application to both analytical test cases and actual remote sensing data from a laboratory under controlled conditions. It is found that the exact solution for a number of optical physics conditions is of the same form as a linearized multiple regression equation, even if nonlinear contributions are made by such factors as surface reflections, atmospheric constituents, or other water pollutants. Limitations on achieving this type of solution are defined. From analytical test case results, it is concluded that constituents with linear radiance gradients with concentration may be quantified from signals which contain nonlinear atmospheric and surface reflection effects for both homogeneous and non-homogeneous water bodies, provided accurate data can be obtained and nonlinearities are constant with wavelength. The effect of error in upwelled radiance measurements is to reduce the accuracy of the least-squares fitting process and to increase the number of points required to obtain a satisfactory fit.

Citation 528

WILEY, MARTIN

Chesapeake Biological Laboratory, University of Maryland,
Center for Environmental and Estuarine Studies, Solomons, MD

Estuarine Processes. Volume I. Uses, Stresses, and Adaptation to the Estuary

International Estuarine Research Conf. , 3rd, Galveston, 1975, Academic Press, NY

1976,541p.

English

In this session were examined historical data from a variety of estuaries in an attempt to determine whether past and present pollution control measures have been effective in improving water quality, or whether there has been a continued, slow but perceptible degradation of the quality of the estuarine environment.

Citation 529

WILKINSON, MARTIN , ANNE R. HENDERSON , CHRISTINE WILKINSON

Dept. of Brewing and Biological Sciences, Heriot-Watt Univ. , Edinburgh, Scotland

Distribution of Attached Algae in Estuaries

Mar Pollut Bull

1976,7(10),183-184.

English

Preliminary studies on distributions of attached algae in British estuaries suggest that the estuaries might be classified on the basis of the flora in the upper reaches. This could contribute to biological assessement of water quality in estuaries.

Citation 530

WILSON, ROBERT E. , AKIRA OKUBO

Marine Sciences Research Center, State University of New York, Stony Brook, N Y 11794

Longitudinal Dispersion in a Partially Mixed Estuary

J Mar Res

1978 (Aug),36(3),427-447.

English

Within a partially mixed estuary both the tidal and the nontidal density-induced circulation exhibits substantial vertical shear. The interaction of this current shear with turbulent mixing across the vertical density gradient contributes to the longitudinal (alongstream) spread of a contaminant introduced into the estuary. A dye tracer experiment conducted in the lower York River Estuary provides abundant evidence for the importance of this "shear effect" to longitudinal dispersion. We have documented the vertical movement of dye, the longitudinal movement of the center of mass, and the longitudinal spread as represented by the variance of the distribution following a point source release. We have presented a shear-diffusion model which describes the vertical distribution of dye as a function of time, and the asymptotic behavior of both the first and second moments of the longitudinal distribution for times very short and very long compared to the time of vertical mixing within the estuary. The model includes the effects associated with nontidal upward advection.

Citation 531

WINDOM, HERBERT L.

Skidaway Inst. of Oceanography, Savannah, GA

Unconfined Dumping of Dredge Spoil Said Better than Dike Method

Work Boat, New Orleans

1972(Oct),29(10),36,38,40,42.

English

Citation 532

WISCONSIN UNIVERSITY

Wisconsin University Water Resources Center, Madison, WI

Eutrophication Abstracts

Eutrophication Program, Madison, Abstracts

1970(May)Issue No. 15,1970(Nov)Issue No. 21-1975(Apr)Issue No. 47.

English

Bibliography with abstracts of eutrophication studies and reports of water systems.

Citation 533

WITHERSPOON, A. M. , CHARLES BALDUCCI, OLIVER C. BOODY, JIMMIE OVERTON

Department of Botany, North Carolina State University, Raleigh, NC 27650

Response of Phytoplankton to Water Quality in the Chowan River System

WRRI North Carolina

1978(June), Project No. B-091-NC.

English

An investigation of seasonal changes in phytoplankton species diversity and biomass, phosphorus uptake kinetics, in-situ and in-vitro algal growth potential and phytoplankton-bacteria interaction in the Chowan River system was conducted from March 1974 through June 1977. The slower-moving water in the lower river promotes longer residence time for nutrients and algae; therefore, it is plagued with seasonal algae blooms. There are five species that may become dominant during the blooms: (1) Anabaena circinalis, (2) Anabaena aegualis, (3) Anabaena wisconsinense, (4) Ancystis (Microcystis) firma, and (5) Aphanizomenon flos-aquae (gracile). The blooms are inversely correlated with nitrate and phosphate concentrations in the river. However, substantial levels of biomass are able to persist after PO4, NO3, and NH3 concentrations are below detectable levels. Nutrient recycling by bacteria and fungal activity, nitrogen fixation, and algal physiological utilization of organic phosphorus may facilitate this process. Nitrate was found to be a preferred source of nitrogen by the bloom algae while other algae seemed to prefer ammonia. Nutrient concentrations in the river (NO3, NH3, PO4) were found to quantitatively support an annual phytoplankton biomass of 0.01 to 30 mg/liter. The higher biomass was found in the lower river during the spring-summer season and in the upper river during the late fall and winter season. Increase in total biomass did not always represent a negative change in water quality. However, poor water quality or late-winter/early-spring increases in nutrient levels subsequently promoted increased biomass by a few species in the lower Chowan, accompanied by a reduction in biomass of other species. This resulted in a rather constant total seasonal biomass even though there may have been a visible bloom on the river. The minimum visible bloom had a mean biomass of 1 mg/l (10exp6 m^3/l). (abbrev)

Citation 534

WOHLSCHLAG, DONALD E. , B. J. COPELAND

Texas Univ. , Port Aransas, Inst. of Marine Science

Fragile Estuarine Systems-Ecological Considerations

Water Resour Bull

1970,6(1),94-105.

English

Studies of fish species and populations indicate a high degree of fragility for estuarine ecosystems. Slight stresses tend to disrupt energy flow systems and lead to lower levels of biological productivity, shortened food chains and poorer diversity of species. For individual species low-level stresses tend to suppress metabolism and growth processes. Minor stresses can also substantially reduce populations. Stress processes ae quantifiable and amenable to mathematical modeling.

Citation 535

WOLLAST, R. , F. DEBROEU

Brussels Univ. (Belgium)

Study of the Behavior of Dissolved Silica in the Estuary of the Scheldt

Geochim Cosmochim Acta

1971(Feb),35(2),613-620.

English

Evolution of the silica dissolved in the Scheldt estuary (Netherlands and Belgium) shows that the reduction in silica content is much greater than that predicted by the dilution curve computed from the mixture of fresh water rich in silica and surface sea water. The removal of silica from the solution is not due to a reaction with clay minerals in suspension, but to biological activity, essentially by diatoms that live preferentially in saline waters. After death, diatoms that become part of the sediments return silica to the interstitial waters, which can then combine with disordered clays of continental origin to give rise to new aluminosilicates richer in silica and in alkaline or alkaline-earth ions.

Citation 536

WONG, GEORGE T. F. , CHESTER E. GROSCH

Institute of Oceanography, Old Dominion University, Norfolk, VA 23508

A Mathematical Model for the Distribution of Dissolved Silicon in Interstitial Waters--an Analytical Approach

J Mar Res

1978,36(4),735-

English

A mathematical model for the distribution of dissolved silicon in interstitial waters is studied. This model includes the input flux of particulate silicon, bioturbation, the dissolution of silicon particles, and the diffusion of dissoled silicon in the interstitial water. It is shown that the model reduces to a nonlinear eigenvalue problem. This problem is shown to have only one eigenvalue which is determined by the solution of a simple algebraic equation. The eigenfunction is shown to be expressible in closed form in terms of elementary functions. The solution falls into one of three classes: 1) all the particles dissolve and the interstitial water at depth is not saturated; 2) all the particles dissolve and the interstitial water at depth is saturated; and 3) the interstitial water at depth is saturated but not all the particles are dissoled. The equations and solutions are analyzed and the dependence of concentration profiles on the parameters of the models is discussed. An exact predictor equation for the particulate flux in terms of the model parameters is also derived. The results of a number of sample calculations and simulations of the concentration profile for two actual cores are also given.

Citation 537

WOOD, LINDSAY W.

North Carolina State Univ. , Raleigh, NC, Dept. of Zoology

The Role of Estuarian Sediment Microorganisms in the Uptake of Organic Solutes Under Aerobic Conditions

North Carolina State Univ.

1970, PhD Dissertation, 75p.

English

A previously used method of measuring uptake of radioisotopes in the water column to determine activity of bacteria populations is modified by dilution with substrate free water, thus slowing reaction, allowing replicate sampling, and produced reasonable filtration rates. Because uptake can be described by Michaelis-Menten kinetics, measurement of maximum velocity, turnover time, and a transport constant is possible on diluted samples. The true velocity, providing actual uptake rate requires a determination of natural substrate concentrations in sediment. Maximum uptake velocity was proportional to microbial biomass in water column. By doubling biomass, maximum velocity should be doubled. Consequently, correcting for amount of dilution produced an estimate of maximum velocity in sediments; however, bacterial cell aggregations at high densities might influence results. Turnover time depend not only on uptake velocity, but also on natural substrate concentration. Loss of labeled carbon dioxide in sediments was lower than in water column, perhaps due to fermentative utilization of substrate. Algal blooms and aquatic vascular plant decay appeared to affect sediment microbial activity. The method needs testing under conditions paralleling microbial environments together with determination of forms involved in uptake of labeled compounds and fate of substrate fermentation products.

Citation 538

ZABAWA, C. F.

South Carolina Univ. , Columbia, SC, Dept. of Geology

Microstructure of Agglomerated Suspended Sediments in Northern Chesapeake Bay Estuary

Science

1978(Oct),202,49-51.

English

Suspended sediments in the turbidity maximum of Chesapeake Bay include composite particles which contain platy mineral grains, arranged both in pellets (attributable to fecal pelletization) and in networks of angular configuration (attributable to electrochemical flocculation and coagulation).

Citation 539

ZEMAITIS, W. L. , GERALDINE V. COX

Raytheon Environmental Research Laboratory, New London, CT 06320

Effects of Organic Enrichment on Benthic Fauna in a Tidal River

Mar Technol Soc

1971(Aug 16-18),7th Annual Conf. , 629-636.

English

The Delaware Estuary receives organic enrichment from many sources: e. g. overtaxed waste-treatment plants; combined-sewer overflows; and direct discharges from industrial sources. Benthic invertebrates of the Delaware, mainly Limnodrilus cervix, reflect organic enrichment by their distribution and abundance. Aquatic Oligochaeta are responsible for secondary pollution in the estuary due to their sediment recycling habits. The worms release organics trapped in sediment by feeding activities, and dissolve relatively inert polymers which will then exert a BOD in the water. This BOD is not estimated in river water samples or in waste discharge analyses, and mathematical modeling of estuary systems would neglect significant real BOD if this benthic community were ignored.

Citation 540

ZIMMERMAN, M. S.

Florida State Univ. , FL

A Comparison of the Benthic Macrophytes of a Polluted Drainage System (Fenholloway River) with an Unpolluted Drainage System (Econfina River)

Florida State Univ.

1974, MS Thesis

English

Citation 541

ZISON, STANLEY W. , KENDALL F. HAVEN, WILLIAM B. MILLS

Tetra Tech, Inc. , Lafayette, CA 94549

Water Quality Assessment: A Screening Method for Nondesignated 208 Areas

US Environmental Protection Agency

1977(Aug), EPA/600/9-77/023,1217p.

English

The objective of this study is to develop a methodology for the preliminary screening of surface water quality applicable for use by nondesignated 208 planning agencies. Analytical methods are included for the assessment of rivers, impoundments, and estuaries. Additionally, methods are provided by which point and nonpoint sources can be evaluated. The water quality parameters analyzed for all three water body types are biochemical oxygen demand, dissolved oxygen, temperature, and sediment accumulation. Other constituents, more pertinent to a particular water body type, are also addressed. The analyses are designed to be performed with, at most, the assistance of a desk top calculator and with a minimal amount of data input.

Citation 542

ZISON, STANLEY W. , WILLIAM B. MILLS, DENNIS DEIMER, CARL W. CHEN

Tetra Tech, Inc. Lafayette, CA 94549

Rates, Constants, and Kinetics Formulations in Surface Water Quality Modeling

US Environmental Protection Agency

1978(Dec), EPA-600/3-78-105,335p.

English

Recent studies are reviewed to provide a comprehensive volume on state-of-the-art formulations used in surface water quality modeling along with accepted values for rate constants and coefficients. Topics covered include system geometric representation (spatial and temporal), physical processes (mass transport, heat budgets, ice formation, light extinction), biological systems (fish, benthic organisms), and chemical processes (nutrient cycles, carbonate system). A detailed discussion is also presented on issues that are ordinarily of primary interest in modeling studies. These include reaeration, dissolved oxygen saturation, photosynthesis, deoxygenation, benthic oxygen demand, coliform bacteria, algae, and zooplankton. These discussions incorporate factors affecting the specific phenomena and methods of measurement in addition to data on rate constants.

Citation 543

ZUBCHENKO, I. Z.

USSR, Astrakhan Fisheries Technical Inst.

Biosorption by Marine Fish of Methianine and Urea Dissolved in Water

J Ichthyol

1977,17(2),336-341.

English

The percutaneous absorption of methionine and urea by two marine fish, Spicara smaris and Trachurus mediterraneus ponticus was investigated using carbon-14 labelled test compounds. Both species of fish proved to be capable of absorbing appreciable amounts of the test compounds, which were widely distributed throughout the body. The mechanism of absorption and the role of the cutaneous layers are discussed.